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THE MONTH

The Symposium

THE two opening articles in the symposium this month on 'Genito-Urinary Disorders' deal with two of the most difficult conditions encountered in general practice: chronic pyelonephritis and chronic infection of the bladder. Of the two, the latter is the more common and therefore the more troublesome. In both discrimination is required in the use of antibiotics. As Mr. Poole-Wilson points out in discussing the treatment of chronic bacterial cystitis, 'it must not be forgotten that permanent cure ultimately depends upon the body resuming its normal powers of resistance' and 'the use of antibiotics as the first line of treatment is discouraged'. The other five conditions dealt with in the symposium—calculi, polycystic disease of the kidneys, renal tumours and the neurogenic bladder—are all rarer conditions, but conditions which the family doctor encounters sooner or later. The concluding article, on 'Congenital anomalies of the genito-urinary tract', provides a brief but authoritative review of a subject of increasing importance in these days when so much more can be done for the congenitally abnormal infant and child.

Postgraduate Medicine

FOR five days in September 1959, 800 persons attended the second world conference on medical education in Chicago, at which 100 formal papers were read, seven organized panels were held and 'countless informal but informed discussions' were presented. The theme of the conference was 'Medicine a Lifelong Study', and the five-day deliberations have now been brought together by Dr. Hugh Clegg and published by the World Medical Association (price £5 5s.) under the title of the theme of the conference.

It is not quite clear what the organizers hoped to achieve from the conference, but two things they definitely have achieved. One is this volume which is a fascinating kaleidoscope of current views on the subject. The second is that, in the words of Dr. S. S. B. Gilder, the rapporteur of the Section on 'Continuous medical education', 'it revealed . . . ignorance of very basic issues. We did not know what the general practitioner really needed, and we did not know whether what we were giving him was successful or not. We heard a lot about what ought to be done, but nobody was prepared to say how it was to be done'. Granted that these words were applied merely to this one section, but it is not unfair comment on the entire conference—at least as disclosed in this volume. Equally interesting are the views put forward by Dr. Oliver Cope, the rapporteur of the Section on

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'Advanced training for general and specialty practice': 'The family doctor's job is a difficult one, and as now set up in most communities a well-nigh impossible one. A good student even finds the job distasteful and seeks specialty practice . . . The general practitioner is forced to practice at a substandard level compared with the specialist, and is immediately in a second-rate position. No amount of primary or postgraduate education can completely wipe out the deficit'. Perhaps one day medical educationists will stop talking about what they think they should do and get on with the job of training family doctors who are cultured, understanding and knowledgeable enough to know when a second opinion should be sought.

The Drunken Driver

THE present state of legislation in this country for dealing with the intoxicated driver is most unsatisfactory. In a carefully reasoned review of the subject in the February issue of *The Criminal Law Review* the view is put forward that 'chemical tests for the concentration of alcohol in the blood provide a solution' to the problem. It is noted that an increasing number of countries have adopted chemical tests for intoxication, and such legislation is divided into two types. The first type consists of laws which permit fixed concentrations of alcohol in the blood to be presumptive that the subject is, or is not, under the influence of alcohol. In many of the states in the United States, for instance, a person with a blood alcohol concentration in excess of 150 mg. per 100 ml. found driving a car is presumed to be 'under the influence of intoxicating liquor'. Under 50 mg. per 100 ml. the presumption is that he is not under the influence, whilst in between these two limits there is no presumption—so far as this test is concerned. The second type is that which provides automatic conviction upon proof that a fixed concentration is present in the blood. In Norway and Sweden this concentration is 50 mg. per 100 ml., and the minimum penalty is disqualification from driving for a year, and a second conviction carries a penalty of disqualification for life.

An interesting, and important, point brought out in this review is that 'those countries with a more enlightened approach to the problem of alcohol and driving . . . have drawn a distinction between driving while severely intoxicated and driving while performance is impaired by alcohol'. The former remains 'a serious criminal offence', whilst the latter is 'regarded as a more technical offence'. As is pointed out, 'it is not necessary to brand as a criminal the driver who has taken only a few drinks in order to persuade him not to take to the road. All that is needed is a reliable method of disqualifying him from driving for a certain period and without the clamour of a public prosecution'. This is an approach to the problem which is deserving of the most serious attention when the time comes—which is now—to bring the law on the subject into line with current views and current knowledge. It is radical revision which is required—not mere patchwork.

The Helicopter as Ambulance

THE novelty of the helicopter is gradually wearing off and sufficient experience has now been accumulated to assess its value in medical emergencies, *vis-à-vis* alternative methods of transport. A useful contribution to the subject is provided by Dr. John Mills, the deputy county medical officer to the Isle of Wight, in the current issue of *Health Horizon*. In 1956, arrangements were completed between the Admiralty and the Ministry of Health for the use of Service helicopters (Westland Whirlwinds) for the transport of emergency cases from the Island to the mainland. Between the summers of 1956 and 1959, 18 such flights were made, transporting 19 patients. These included six cases of 'hæmorrhage below the membrane covering the brain', two fractured skulls and two fractured spines, four extensive burns, and three cases of acute poliomyelitis with respiratory failure. Eleven of these patients made complete or partial recovery, and eight died. Their destinations included The Hospital for Sick Children, Great Ormond Street, London, Stoke Mandeville Hospital, Aylesbury, and the Infectious Diseases Hospital, Portsmouth.

Satisfactory though this record may be, there are certain disadvantages in using helicopter-ambulances. In the first place they are very dependent on the weather. Dr. Mills quotes a case in which it was impossible to use a helicopter because of fog but, by taking the patient by road, he reached his London destination at least twelve hours before the journey could have been made by air. Further, the ability of helicopters to lift crew and passengers depends on air temperature and velocity: on a hot windless day it may not be possible to carry a crew of two with a patient and escort, and the navigator has therefore to be left behind. There is also the problem of airsickness in turbulent weather conditions, and a lung inflator for artificial respiration needs a special motor or batteries. Finally, the cost is not inconsiderable. By Service helicopter the charge from the Isle of Wight to London ranges from £150 to £198, by B.E.A. helicopter (to Battersea) it is about £100, by B.E.A. Dakota (to London Airport) it is around £80; for a Rapide hired from the Portsmouth Aero Club it is around £20. Thus, although, as Dr. Mills points out, 'the helicopter does fulfil an extremely useful role under emergency circumstances', it is clearly a method of ambulance transport that must be used with discrimination.

The Chelsea Pensioners

AT a cost of £200,000 the 400 pensioners at the Royal Hospital, Chelsea, have been provided with what 'is believed to be the most modern infirmary in the world'. So, after twenty years of improvised hospital accommodation in Surrey, these colourful veterans are able to enjoy their old privilege of hospital accommodation within the precincts of their famous home—at least except for major surgery. The original infirmary, which was designed by Sir John Soane (the architect of the Bank of England), was completed in 1816 and destroyed by bombing in 1941.

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The new infirmary, with 72 beds in four three-bay wards and eight single rooms for very ill patients, is almost as colourful as the inmates. The colour scheme is royal blue panels on a light grey background, but the old scarlet blankets have been retained. Blankets of this type have been in use in the infirmary since they were introduced by Florence Nightingale as part of her work to reform military hospitals. The day-rooms are decorated with curtains whose pattern 'consists of soldiers dressed in the various colourful uniforms that have been worn by famous regiments throughout Britain's military history, the badges of existing and former regiments and other regimental detail'. Amid these surroundings the inmates (30 of whom are permanent residents), sitting either in easy chairs specially designed for them by the Ministry of Works, or reclining on special adjustable beds, are able to enjoy such modern conveniences as electric shavers, radio and television. These, however, are not their only interests in life, and one 90-year-old inmate proudly boasts that he can complete a well-known newspaper crossword puzzle in half-an-hour. He is by no means the oldest pensioner—the present oldest one is 97. He may well find it difficult to beat the record, however: the pensioner who left the Hospital at the age of 101 to marry a 70-year-old lady—and survived to enjoy six years of married bliss.

Giraffe-necked Women

YET another Eastern myth has been exploded by scientifically inclined doctors. This time it is the myth of the giraffe-necked women of the Padaung tribe of East Burma. For long it has been claimed that this tribe could produce considerable elongation of the necks of their womenfolk—hence the name, giraffe-necked. The method was to apply a long spiral of brass wire to a girl's neck, usually starting with ten coils between the ages of 8 and 10 years, and gradually increasing the number until finally there were seventeen or eighteen coils around the neck. This undoubtedly produced apparent elongation of the neck, and the curiosity of orthopædic surgeons was aroused as they are always on the look-out for means of stimulating bone growth. The results of this curiosity are reported by R. Roaf (*J. Bone Jt Surg.*, 1961, **43-B**, 114) who gives details of one such case.

This is a lady of 36, who had her first rings applied at the age of 10 years and eventually had seventeen coils. Five years ago she had the coils removed. Although the neck was undoubtedly elongated, measuring 7 inches (18 cm.) from the mastoid process to the sternoclavicular joint (she herself was only 4 feet 10 inches [147 cm.] tall), x-rays showed that this was not a true elongation of the cervical spine. The appearance of lengthening of the neck is due to depression of the shoulder girdle and moulding of the upper ribs, as a result of which the upper portion of the thorax is compressed and elongated and is, so to speak, incorporated into the neck. Certainly the x-ray of the neck, reproduced in the report, has a distinctly giraffe-like appearance but, as the report points out, 'the elongation of the neck is apparent only and the Padaung tribe are no more successful than modern orthopædic surgeons in their efforts to produce over-growth of bone'.

PROBLEMS OF CHRONIC PYELONEPHRITIS

By A. R. HARRISON, M.D., M.R.C.P.
Assistant Physician, St. Peter's, St. Paul's and St. Philip's Hospitals

It is now believed that infections of the upper urinary tract with pyogenic bacteria rarely remain confined to the renal pelvis but involve the renal tissues as well. Accordingly the word pyelitis has largely become replaced by the term pyelonephritis.

PROBLEMS OF DEFINITION

Very little confusion exists regarding the clinical definition of acute pyelonephritis nor is there any doubt that it is due to bacterial infection. Except in young children the clinical features of the disease, consisting of the sudden onset of fever, rigors, loin pain, frequency and dysuria, are distinctive and in most cases examination of the urine will reveal the infecting organism. When, however, we turn to chronic pyelonephritis we find not only that the clinical features as described by physician, surgeon and pædiatrician are variable and non-specific but also that proof of its bacterial origin is not always forthcoming. It is therefore understandable that the morbid anatomist is often the first person to recognize the disease and that his description of its lesions has become widely accepted as the only definition of chronic pyelonephritis.

PATHOLOGICAL AND CLINICAL FEATURES

The gross and microscopic changes in the kidneys which appear to result from their chronic or repeated infection with pyogenic bacteria were described in the early years of this century. Chronic pyelonephritis may be unilateral, but when both kidneys are affected their involvement is characteristically asymmetrical. The kidneys are usually reduced in size and irregularly distorted by scars which vary in extent. The cut surface shows that these scars extend throughout the renal substance, and usually they have the shape of a wedge with the apex at the pelvis. Microscopic examination of the lesions reveals that the interstitial tissue is infiltrated by small round cells or, in cases with recent infection, polymorphonuclear leucocytes. In the affected areas many of the tubules appear atrophied whilst others may be dilated, lined with flattened epithelium and filled with casts of eosinophilic material. The appearance of these dilated tubules may resemble that of thyroid tissue. The glomeruli are less affected, some appearing to be normal, others are surrounded by a ring of fibrous tissue, and yet others may be atrophied or fibrosed. The medium-sized arteries show a variable thickening and fibrous replacement of the media and intima, and the

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arterioles may be greatly narrowed because of concentric cellular proliferation of their walls. It must be stressed that the lesions are patchy and that areas of normal or hypertrophied renal tissue are always found.

The earliest attempts to define the clinical features of this disorder were made by urological surgeons, who recognized that the changes of chronic pyelonephritis were often to be found in cases of urinary-tract obstruction. It was also realized that the condition occurred, though more rarely, in the absence of other gross disorders of the urinary tract. Thomson-Walker (1914) in his description of the clinical features makes a number of statements which have a distinctly modern flavour. He was aware of the insidious onset, long course, periodic absence of bacilluria and the frequent misdiagnosis as chronic cystitis.

That chronic pyelonephritis might cause hypertension and give rise to the clinical picture of what is loosely termed chronic Bright's disease did not become apparent, however, until Longcope and Winkenwerder (1933) and Weiss and Parker (1939) reported the clinical case histories in a number of patients whose kidneys showed typical morbid anatomical and histological features at post-mortem examination. Many other facts and problems relating to the disease as it may present to the general practitioner or physician rather than to the surgeon emerged from these and later studies. They may be epitomized by the statement that chronic pyelonephritis is a common post-mortem finding but a relatively rare clinical diagnosis.

PROBLEMS OF ETIOLOGY AND PATHOGENESIS

Perhaps the most fundamental problem is whether the morphological changes which we term chronic pyelonephritis are invariably the result of bacterial infection. In cases in which there has been good clinical and bacteriological evidence of chronic or repeated urinary infection, or in which histological examination reveals abscess formation or acute inflammatory changes as well as chronic scarring, the question does not arise. Chronic pyelonephritic changes, however, may be found in cases in which repeated urine cultures have been sterile and there is no clinical evidence of recent or past infection. This point has been discussed by Rosenheim (1960), who also observed that similar appearances may occur in association with other conditions such as renal ischæmia or chronic potassium depletion. Despite these minor reservations there has never been any widespread doubt that chronic pyelonephritis is, as its name suggests, caused by bacterial infection.

Bacteriology.—The organisms which commonly cause acute urinary-tract infections are well known, the most frequent invaders being ***Escherichia coli***, ***Streptococcus fæcalis***, ***Staphylococcus aureus***, ***Proteus vulgaris*** and ***Pseudomonas pyocyanea***, but for various reasons the bacteriology of chronic pyelonephritis does not rest on such a firm basis. As already mentioned, urine cultures may be sterile and when cultures are positive it is not uncommon to find mixed infections or, particularly since the introduction of

antibiotics, a change in the urinary flora on repeated culture. Direct bacteriological examination of renal tissue at necropsy may give misleading results for there is always the possibility that organisms found in tissues at necropsy are mere agonal invaders. Culture of renal biopsy specimens may provide useful information, but as yet there are insufficient data to allow of any firm conclusion regarding the bacterial population of the kidney itself in chronic pyelonephritis.

Route of infection.—The organisms which appear to be concerned are inhabitants of the colon, and for many years the route of infection has been debated. The two principal theories are that bacteria reach the kidney in the blood stream or from the bladder via the ureters. No attempt will be made to marshal the large body of clinical and experimental evidence which has been brought forward in support of one or other of these theories, but it is probable that renal infection may occur by both routes, depending upon circumstances. It cannot be doubted that hæmatogenous infection occurs in cases of septicæmia or pyæmia. On the other hand, many cases of chronic pyelonephritis occur in association with disorders of the lower urinary tract such as bladder-neck obstruction or neurogenic bladder disturbances. Cystitis is common in such conditions and there is no difficulty in postulating that infection might travel against the urinary current if it is remembered that vesico-ureteral reflux occurs in a variety of these lower urinary-tract disorders. An additional and very old argument in favour of the ascending route of infection is based on the different incidence of pyelonephritis between the sexes, for the disease is commoner in girls than boys and in women than men except in older age-groups. It is hardly necessary to argue that the female bladder is more vulnerable to infection than the male and it is generally believed that bacteria invade the bladder via the urethra.

A number of authorities, however, believe that having reached the bladder and multiplied in the urine organisms then travel via the lymphatics to the blood stream and thence to the kidney. It is known that bacteriæmia may follow instrumentation of the urethra, for this was demonstrated long ago by Barrington and Wright (1930). Nevertheless, when pyelonephritis follows cystitis in the absence of instrumentation it seems more probable that infection reaches the kidney via the lumen of the urinary tract.

PREDISPOSING FACTORS

Even if we assume that chronic pyelonephritis is invariably due to bacterial infection and recognize that organisms may readily travel to the kidney by various routes, we are still faced with the questions of what factors render the kidney susceptible to infection and why it appears that only a small proportion of cases of acute pyelonephritis progress to the chronic stage. There is no clear answer to these questions, nor, as Beeson (1955) has pointed out, do we understand why the organisms which are commonly

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associated with the disease should provoke the type of tissue reaction which we recognize as chronic pyelonephritis.

In experimental work on animals it has been shown repeatedly that it is difficult to produce renal infection unless the kidney has been traumatized or the urinary tract has been obstructed. Similarly, clinical experience has shown that in the majority of cases chronic pyelonephritis is secondary to some other disorder of the kidney or urinary tract. In particular the disease is a common complication of any disorder which causes obstruction to the outflow of urine or which interferes with normal emptying mechanisms. Even pregnancy, which has long been known to be a predisposing cause of pyelonephritis, must be included in this category of disorder, for the dilatation of the upper ureters and renal pelves which commonly occurs probably interferes with the normal outflow of urine from the kidney.

In recent years it has become apparent that dynamic dysfunction of the urinary tract, particularly vesico-ureteral reflux, may play an important part in the pathogenesis of chronic pyelonephritis, especially in children. Vesico-ureteral reflux may occur in a variety of disorders, including lower urinary tract obstruction, neurogenic bladder disturbances whether congenital or acquired, or so-called primary mega-ureter. Edwards (1960), however, using the technique of micturating cysto-urethrography to investigate 41 patients with pyelographic appearances typical of chronic unilateral or bilateral pyelonephritis, found reflux in 32. In none of these patients was there evidence of lower urinary obstruction or neurogenic bladder disturbance, and in some the diagnosis of chronic pyelonephritis was confirmed at subsequent nephrectomy. It is possible that in such cases reflux is the result rather than the cause of chronic pyelonephritis, although the common association of pyelonephritic scarring with reflux which is known to be secondary to some other disorder of the lower urinary tract suggests that it is an important factor in pathogenesis.

One other point regarding vesico-ureteral reflux needs to be considered. It is often stated that chronic pyelonephritis may become established in patients with no other abnormality of the kidney or urinary tract; this is said to be the case particularly in children and young adult women. It will be obvious, however, that a condition such as reflux, which is essentially a disorder of function rather than structure, cannot be identified at necropsy, nor is it readily recognized during life unless special investigations are carried out. It is therefore possible that the true incidence of so-called non-obstructive or primary chronic pyelonephritis is lower than is generally believed.

On the other hand, if the disease can occur in the absence of any other renal or urinary-tract disorder then it must be confessed that we do not understand what determines the protracted nature of the infection. There is some experimental evidence (De Navasquez, 1954) to suggest that once the kidney has been the site of acute infection and healing, small intra-renal

scars may cause obstruction at nephron level and that this renders the kidney susceptible to reinfection. It is therefore possible that obstruction at some level is essential to the evolution of chronic pyelonephritis, but why obstruction should predispose to the persistence of chronic smouldering infection or render the kidney more susceptible to reinfection is not fully understood.

One final point merits consideration. In many recent publications it is implied that chronic pyelonephritis may originate from a lower urinary-tract infection which has been introduced by catheterization. It would seem doubtful if such a chain of events can take place in the absence of any pre-existing renal or urinary-tract disorder, but it may well be that such iatrogenic infections play a part in the reinfection of already damaged kidneys.

PROBLEMS OF DIAGNOSIS

When signs of impaired renal function develop in patients who are known to have suffered repeated or chronic urinary infections, particularly if these are superimposed on some other abnormality of the urinary tract, the diagnosis of chronic pyelonephritis presents little difficulty. In others, however, the onset of the condition cannot be dated, its clinical course may be silent and apparently protracted, and even when it finally gives rise to manifestations which demand medical attention it may easily be misdiagnosed if pyuria is absent and the urine is sterile on culture. Many patients with chronic pyelonephritis present with the symptoms of renal failure; that is, with increasing lassitude, anorexia, thirst, polyuria and nocturia. Others present as cases of apparent benign or malignant essential hypertension. Often these patients will admit to no symptoms indicative of past or present upper urinary-tract infection. It can be readily understood that in these circumstances a clinical diagnosis may be virtually impossible, and even if full use is made of the various forms of investigation which are now available diagnosis may still be difficult.

The urine.—Albuminuria is usually present, although not in the amounts encountered in chronic nephritis. It rarely exceeds 5 grammes in twenty-four hours and in many cases is much less than this. In some cases organisms may be seen on examination of a direct film and pyuria is obvious but, as already mentioned, in other cases the urine may be sterile on culture and there may be no significant pyuria. In such cases repeated examination of the urine may reveal evidence of infection, but when the disease is of very long standing even repeated specimens may be sterile. Pears and Houghton (1958) have shown that the urinary white-cell excretion may increase in these cases of latent pyelonephritis after the intravenous injection of a pyrogen. This test appears to be reasonably specific, but requires further evaluation.

The pattern of renal failure.—Although hypertension is a common mani-

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festation of chronic pyelonephritis, in general, the presence of fairly advanced renal failure without hypertension is found more often in this than in other common chronic renal diseases. Furthermore, there is a tendency for tubular function to deteriorate more rapidly than glomerular function. In consequence, inability to concentrate the urine may be disproportionate to the rise in blood urea level or to the reduction in glomerular filtration rate revealed by urea or creatinine clearance tests. Indeed, rarely, the main manifestation of renal failure may be inability to conserve water and sodium chloride, and the patient may present with a picture not dissimilar to Addison's disease. When hypertension is absent deterioration in renal function may be remarkably slow and it may even fluctuate quite markedly for no very obvious reason. These features may help to distinguish the renal failure of chronic pyelonephritis from that of other renal diseases.

Radiological appearances.—It is sometimes possible to make a reasonably confident diagnosis from radiological appearances. These have been described by Hodson (1959). The kidney in chronic pyelonephritis is usually smaller than normal and when both kidneys are involved their outlines are characteristically unequal in size. The essential features, however, are the irregularities in outline resulting from the focal nature of the disease and the deformities of the calyces which are usually described as clubbing.

Renal biopsy.—Another diagnostic procedure which has come into use in recent years is percutaneous renal biopsy. Unfortunately, since chronic pyelonephritis is essentially a focal disease, renal biopsy may not always provide conclusive diagnostic evidence. In skilled hands, however, it appears to be reasonably free of serious risk, and it may enable a diagnosis of chronic pyelonephritis to be made when the disease is not sufficiently advanced to produce a typical radiological picture or a characteristic pattern of renal failure.

In children.—In children the disease is particularly difficult to diagnose because it occurs mainly in the younger age-groups. Stansfeld (1954), in a survey of children under 14 years of age, found that the incidence of the onset of pyelonephritis was much higher in the first year of life than in subsequent years, and in those cases arising in infancy pyelonephritis had its highest incidence in the neonatal period. In these young infants the predominant symptoms are anorexia, vomiting and failure to gain weight. Since the presenting symptoms are predominantly gastro-intestinal rather than renal the diagnosis may be overlooked, or at least delayed until infection has become established and difficult to eradicate.

PROBLEMS OF TREATMENT

The treatment of chronic pyelonephritis may involve several problems: the eradication or control of infection, the management of renal failure and the surgical correction of lesions which may predispose to the persistence or recurrence of infection. In addition, the management of unilateral pyelo-

nephritis, whether or not it is associated with hypertension, presents its own particular problems.

THE TREATMENT OF INFECTION

It is doubtful if the results of treatment of established chronic pyelonephritis have improved appreciably since the introduction of antibiotics and chemotherapeutic drugs. When advanced renal scarring is present it is obvious that antibacterial therapy cannot reverse the lesions. For that matter it is uncertain if even successful control of infection has much influence on the progression of chronic pyelonephritis once it has reached a certain stage. It is possible that destruction of the renal parenchyma may continue in the absence of active infection, either because of progressive vascular lesions or because of the slow contraction of fibrous tissue.

On the other hand, when bacteriological studies reveal that active infection is present an attempt must be made to eradicate or at least control it. In most cases it is possible to sterilize the urine by the use of appropriate antibiotic or chemotherapeutic drugs, but this achievement in no sense represents a cure. Numerous studies show that relapses are common, particularly when chronic pyelonephritis is a complication of other lesions of the urinary tract (Garrod, Shooter and Curwen, 1954; Kass, 1955). Relapses may be due to the same organism, to the emergence of resistant strains of that organism, or to entirely different bacteria. We do not know whether these relapses represent a true reinfection of the kidney from some reservoir such as the colon or whether they result from failure to eradicate organisms from the renal tissue. There is little doubt that some relapses are due either to the use of inadequate doses of antibacterial drugs or to insufficiently prolonged treatment. If chronic pyelonephritis is believed to be an interstitial infection of the renal tissue then any antibiotic or sulphonamide must be given in amounts appropriate to the treatment of any tissue infection. It is easy enough to sterilize the urine and presumably to eradicate surface infection of the urinary tract with quite small doses of those antibacterial drugs which are excreted in the urine in high concentration. This, however, is not the aim of treatment. Nevertheless, long-term so-called suppressive chemotherapy may be of value in cases in which we believe that the kidney is constantly being reinfected by the urine, for example in cases of vesico-ureteral reflux.

As is the case in so many other diseases, prevention is better than cure. There seems little doubt that the use of more vigorous and prolonged treatment in cases of so-called acute 'pyelitis', and the institution of more regular early follow-up examination in such cases, would result in a reduction in the incidence of chronic pyelonephritis.

MANAGEMENT OF RENAL FAILURE

Perhaps the most important point in the metabolic management of chronic pyelonephritis, and the only one which can be discussed here, has to do

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with the relatively selective impairment of renal tubular function which is characteristic of the disease. Patients with chronic pyelonephritis are often ill because of the abnormal urinary loss of water and sodium rather than because of the retention of nitrogenous metabolites. Accordingly it is often possible to effect a worthwhile improvement in their state by insisting on a high fluid intake, supplementing their sodium intake with salt or sodium bicarbonate and providing them with a diet which is adequate in calories but moderately restricted in its protein content.

The position, of course, is different when hypertension and cardiac failure are present. Then treatment may be a matter of great difficulty, and the prognosis is poor.

SURGICAL TREATMENT

Again it must be stressed that the majority of cases of pyelonephritis are associated with other disorders of the urinary tract. By no means all of these can be corrected by surgery, nor is an operation for the relief of obstruction necessarily followed by the disappearance of infection. Nevertheless, all patients with persistent or recurrent infection, and this applies particularly to children, should undergo a thorough urological examination, for the difficulties of eradicating infection in the continued presence of other renal or urinary-tract lesions are almost insurmountable.

Unilateral pyelonephritis.—When only one kidney appears to be involved treatment resolves itself into the question of whether or not nephrectomy should be performed. Ideally, operation should only be undertaken if one kidney can be shown to be functionally perfect and free from infection and if the diseased kidney is causing symptoms or is thought to be a likely source of trouble in the future. When severe hypertension is due to unilateral chronic pyelonephritis, nephrectomy is followed in some, but not all, cases by dramatic relief.

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THE DIAGNOSIS AND MANAGEMENT OF CHRONIC INFECTION OF THE BLADDER

By D. S. POOLE-WILSON, M.Ch., F.R.C.S
Surgeon in Charge, Genito-Urinary Department, Salford Royal Hospital; Lecturer in Urological Surgery, University of Manchester

A PATIENT suffering from chronic cystitis usually presents himself complaining of suprapubic discomfort, frequency of micturition and dysuria. Pyuria is present. The mode of onset and the persistence of symptoms vary considerably. In some the initial stage is acute and the symptoms then subside into a less tense but chronic form. In others the acute distress continues unabated. In still others the onset may be insidious and the symptoms, although mild, persistent or even increasing in intensity. The management and treatment of such patients is the problem considered in this article.

Chronic cystitis may be considered under the following etiological headings:—

(1) Chronic bacterial (non-specific) cystitis
(2) Varieties of chronic non-specific cystitis peculiar to women
(3) Specific infections: (a) Tuberculosis
(b) Syphilis
(4) Parasitic infections: (a) Schistosomiasis (bilharziasis)
(b) Trichomonal infections
(5) Abacterial pyuria
(6) Interstitial cystitis

CHRONIC BACTERIAL (NON-SPECIFIC) CYSTITIS

Acute cystitis may occur without any apparent predisposing cause. The attack is then usually of short duration. If the attacks are recurrent or if the cystitis becomes chronic it is probable that some predisposing factor is present and that without its removal treatment of the infection will either be unsuccessful or achieve only a temporary respite. Indeed it is doubtful whether chronic pyogenic cystitis exists for any length of time in the absence of some such causative factor. The removal of this factor in the presence of gross infection may, however, be hazardous. The management of chronic cystitis has therefore a twofold objective: (i) control of the infecting organism; (ii) diagnosis and removal of the underlying predisposing cause.

The infecting organisms.—Escherichia coli is the most common infecting organism but the following pyogenic bacteria may also be found either alone or in mixed infections: *Staphylococcus aureus, Staphylococcus albus, Streptococcus fæcalis, Proteus vulgaris, Pseudomonas pyocanea, Aerobacter aerogenes, Paracolon bacillus* and *Proteus morganii*. In the past gonorrhœal cystitis often followed urethritis but is now rarely seen.

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Changes in the bladder wall.—The cystoscopic appearance of the bladder wall varies considerably with the severity and chronicity of the infection. Different areas of the bladder may also show quite different changes simultaneously. In a mild case the bladder wall is injected and the mucosa appears slightly œdematous—hyperæmic cystitis. In the more severe form the mucosa becomes much more congested and assumes a red velvety appearance. Bullæ appear beneath the mucosa. Epithelial erosion may give rise to areas of ulceration. In more severe attacks muco-purulent material may become attached to the bladder wall and at times may become encrusted with phosphate (encrustation cystitis). Rarely, and most commonly during severe attacks of typhoid fever or bacillary dysentery, large areas of the bladder mucous membrane may slough and separate as a cast of the interior of the bladder. If recovery occurs gross fibrosis ensues. At times the infection may travel through the bladder wall giving rise to pericystitis and pelvic cellulitis. Less severe but long-standing chronic infections may give rise to cystitis cystica and leukoplakia.

THE CONTROL OF THE INFECTION

Despite the vast advances which have been made in the control of infection by drug therapy it must not be forgotten that permanent cure ultimately depends upon the body resuming its normal powers of resistance. To this end the general well-being of the patient must be raised to its maximum level by ensuring adequate rest and diet and the control of such secondary causative factors as diabetes and anæmia.

A wide range of sulphonamides, antibiotics and other compounds are now available for use as urinary antiseptics. In general, owing to the risk of producing resistant bacterial strains and also on the grounds that cheaper remedies may be available, the use of antibiotics as a first line of treatment is discouraged. For ideal treatment the nature and sensitivity of the infecting organisms should be tested and the appropriate drug administered. The urinary investigation, however, will take up to forty-eight hours and it will usually be desirable to start treatment before such an interval. As most urinary infections are due to *E. coli*, treatment should usually be started by administering, together with an alkaline diuretic, one of the sulphonamides, which are active against most of the gram-negative urinary infections and also against many gram-positive organisms, and only proceeding to the use of antibiotics when such treatment is proving unsuccessful and an exact choice of a suitable drug can be made. On the other hand, if a patient is seriously ill or if the history and the appearance and smell of the urine suggest that a virulent mixed infection is present, then, after collecting a specimen of urine for laboratory examination, treatment must be initiated with either a combination of antibiotics, which will cover the gram-positive and gram-negative organisms, or one of the suitable wide-spectrum antibiotics. Progress should be checked by periodic laboratory investigation and the urinary antiseptic changed when necessary. It must be remembered

that resistant organisms may emerge during the course of treatment or secondarily infecting organisms may become predominant. Care must be taken that antibiotics are not used for longer than their normal period of usefulness. Treatment must also be continued for at least some days after the urine has become sterile; indeed in many cases of troublesome chronic infection it is well to keep the patient on alternating courses of a suitable sulphonamide and nitrofurantoin, for at least three to four weeks so as to make sure that any lurking residual infection may be eradicated.

A detailed survey of all the available urinary antiseptics is far beyond the scope of this article. The merits and demerits of many of them have recently been discussed in *The Practitioner:* e.g. the sulphonamides (Crozier, 1961) and the antibiotics (MacLean, 1960). Those most commonly employed may be reviewed under the following headings:—

Sulphonamides.—Sulphadimidine, 0.5 to 1 g. six-hourly; sulphafurazole, 0.5 to 1 g. six-hourly; sulphamethizole, 0.1 to 0.2 g. six-hourly, are suitable for urological purposes.

In recent years the long-acting sulphonamides have been introduced. It is claimed that they maintain a therapeutic blood level for twenty-four hours and that therefore a single daily maintenance dose is sufficient. Sulphamethoxypyridazine, 0.5 to 1 g. daily, and sulphadimethoxine, 0.5 to 1 g. daily, fall into this group. 'Bimez' and 'dosulfin' are mixtures of a short- and long-acting sulphonamide, which take up an intermediate position between the other two groups.

The antibiotics.—Penicillin still maintains its position as the most useful antibiotic against most gram-positive bacteria. Some strains of *E. coli* may also be affected by the high concentration which it reaches in the urine. Streptomycin is effective against *E. coli* and some varieties of Pseudomonas and Proteus, but resistant forms are very prone to develop. The joint administration of penicillin and streptomycin covers a large range of organisms and may be useful for clearing infections before and during surgical procedures.

The tetracyclines offer a wide range of cover. Unfortunately Pseudomonas is only slightly sensitive and *Proteus vulgaris* is usually resistant. Chloramphenicol covers approximately the same field but again Pseudomonas and Proteus are usually insensitive, and with heavy dosage it may occasionally cause aplastic anæmia. The total dosage should not exceed 25 g.

Proteus vulgaris and *Ps. pyocyanea* may be very difficult to destroy. Novobiocin may be effective against *Proteus vulgaris*, whilst kanamycin includes in its range of action *Aerobacter aerogenes*, *E. coli* and *Proteus vulgaris*. Carroll and Malette (1961) have recently reported considerable success in the treatment of *Ps. pyocyanea* with 'colymicin'. Unfortunately this drug is not yet available in this country.

The nitrofurans.—Since its introduction nitrofurantoin has proved itself a most useful drug. It has a wide range of action and may be effective in eliminating a *Proteus vulgaris* or *Ps. pyocyanea* infection (Fairbrother, 1957).

THE UNDERLYING CAUSES AND THEIR TREATMENT

The causes underlying chronic non-specific bacterial cystitis may be classified as follows.

(1) *Infections in the kidney and ureter.*—The response of the bladder to infection reaching it from the kidney is very variable. In some instances a persistent cystitis ensues, which only clears up with the healing or removal of the infecting source. In other cases pus from a chronic pyonephrosis may pass into the bladder causing a gross pyuria and yet giving rise to no apparent change in the bladder wall.

(2) *Lesions present in the bladder.*—Whilst not in itself the cause of cystitis the presence of a *vesical calculus* often causes trauma and œdema of the bladder wall leaving it unduly prone to infection. Once cystitis occurs it rarely resolves until the stone is removed. It must also be remembered that vesical calculi are often the result of inadequate vesical emptying.

The presence of a vesical *diverticulum* is almost invariably associated with obstruction at the bladder neck. Certainly, when a diverticulum has formed some residual urine is constantly present and the bladder becomes vulnerable to infection. Once cystitis is present it is rarely possible to eradicate it without relieving the obstruction at the bladder neck and removing the diverticulum. In the presence of multiple diverticula it may be impossible to clear the bladder of infection permanently.

Benign *papillomas* may remain in a bladder for long periods without infection arising. Necrosis, however, is prone to occur in *malignant tumours* and forms an ever-present nidus for infection. Cystitis once established is a troublesome complication. In the first place it hinders accurate diagnosis by making it almost impossible to define the limits of the tumour. There is thus a great tendency to overestimate the extent of the lesion. Before carrying out a diagnostic cystoscopy every effort should therefore be made to clear up existing cystitis. Much of the pain of a bladder tumour is also due to the accompanying cystitis and great relief may be obtained from its abatement. The dangers of subsequent treatment are also lessened. This applies particularly to deep x-ray therapy. In the absence of infection the reaction to treatment may give rise to some frequency and dysuria; in the presence of gross infection, and certainly if it is complicated by inadequate emptying of the bladder, a gross virulent cystitis may result.

(3) *Obstruction at the bladder neck.*—Obstruction at the bladder neck, whether due to benign adenomatous hypertrophy, a fibrous bladder neck or to carcinoma of the prostate, sooner or later gives rise to the presence of some residual urine. The dangers of infecting such a bladder are well recognized and place considerable responsibility on the surgeon carrying out vesical instrumentation or prostatic surgery. When infection is already present its degree may be reduced by suitable treatment but will almost certainly return unless permanent free drainage of the bladder is secured. Once this has been achieved, and provided other complicating factors such

as chronic renal infection or gross diverticulum formation are not present, the bladder will usually clear itself of infection.

(4) *Chronic prostatitis and stricture formation.*—Chronic prostatitis may be a very troublesome cause of recurrent attacks of cystitis or trigonitis. Accompanying attacks of epididymo-orchitis may be a great source of anxiety and inconvenience. When there is no permanent response to urinary antiseptics and prostatic massage, relief may often be obtained in those who have no further wish to father a family by carrying out a perurethral resection of the prostate and ligation of the vasa.

CHRONIC NON-SPECIFIC BACTERIAL CYSTITIS IN WOMEN

Cystitis in women, whilst in general similar to that occurring in the male, has some special features which require comment. Acute attacks of cystitis are more common in women than men. They are often of a relatively mild nature but tend to be recurrent. Whilst the infection may descend from the kidney it more commonly reaches the bladder either by ascent of the urethra or by lymphatic spread from the genital tract and colon. The short and wide urethra favours ascending infections, which are often of the nature of a urethro-trigonitis. Following subsidence of the acute attack it seems probable that infection may linger in the para-urethral glands or Skene's ducts and for its rekindling only requires some mild traumatic or congestive stimulus. In other instances infection appears to reach the trigonal area by lympathatic spread from the cervix or vagina. Certainly trigonitis commonly accompanies cervicitis and leucorrhœa. Chronic cystitis and senile vaginitis are also frequent companions. Even in the acute phases of these recurrent attacks of cystitis cystoscopy commonly reveals that the acute inflammatory changes are confined to the trigone and base of the bladder. During the quiescent intervals the mucosa around the vesical neck may appear congested and thrown into unusually marked œdematous folds. The trigonal area may be mildly injected and in part covered by a semi-transparent pellicle, which extends upwards from the internal meatus. This appearance has been described as œdema trigoni pseudo-membranosum. The urine at this phase is often sterile.

The treatment of these recurrent attacks tends to be unrewarding. Every effort must be made to eliminate any causative factor in the genital tract. In the acute phase drugs appropriate to the sensitivity of the infecting organism, which is commonly *E. coli*, are administered. Subsequently, alternate fortnightly courses of small doses of one of the sulphonamides and of hexamine mandelate may help to prevent recurrent attacks and break an apparent vicious circle. In some women the presence of a cystocele may give rise to incomplete emptying of the bladder. When infection occurs it is prone to be chronic and only resolves following repair of the cystocele.

Chronic infection of the para-urethral glands may at times give rise to some contraction of the urethra, which causes difficulty in emptying the bladder and may be followed by mild chronic cystitis. Dilatation of the

urethra and adequate urinary antiseptics will often give complete relief. More rarely, fibrosis occurs around the internal meatus and may give rise to considerable chronic retention. This condition rarely responds to dilatation but may be relieved by carrying out a careful perurethral resection of the bladder neck. The fibrous tissue is usually removed from about 4 to 8 o'clock at the internal urethral margin. Care must be taken to avoid rendering the patient partially incontinent by too extensive a resection.

CHRONIC CYSTITIS DUE TO SPECIFIC INFECTIONS

Tuberculous cystitis.—Tuberculous cystitis is always secondary to a renal or genital lesion. The onset may be very insidious—slight but persistent frequency and dysuria accompanied by a sterile pyuria may be the only signs and symptoms. Such findings should invariably lead to a full investigation. The diagnosis can only be considered complete when the presence of *M. tuberculosis* has been confirmed by culture or guinea-pig inoculation and the site of the primary lesion has been determined. The degree of bladder involvement is very variable. In early cases the mucosa may show only a mild patchy erythema. The ureteric orifices may appear normal or that corresponding to an infected kidney may be red and œdematous. In more advanced cases the whole bladder wall may appear inflamed and show areas of superficial ulceration.

Treatment must be directed to the healing or eradication of the primary lesion. To this end a patient is put on a course of anti-tuberculous drugs such as: streptomycin, 1 g. daily; isoniazid, 400 mg. daily; and *para*-amino-salicylic acid (PAS), 12 to 18 g. daily. This treatment is continued for 120 days, after which the streptomycin is discontinued but the isoniazid and PAS continued for varying periods up to two years. Under such treatment almost all *M. tuberculosis*, unless protected from the drugs by fibrosis or isolation in an abscess cavity, will be destroyed. An early renal lesion will heal completely. In more severe lesions a cortical abscess may require removal by cortical decapitation (renal cavernotomy) or partial nephrectomy. More rarely now nephro-ureterectomy may be required for the removal of a disorganized kidney. Genital lesions usually regress. Rarely an epididymectomy or orchidectomy may be required.

With the healing of the renal or genital lesion the vesical changes regress. If the bladder involvement has been slight a normally functioning organ will remain. If ulceration has been present healing may be accompanied by considerable fibrosis and diminution in the size of the bladder. In such circumstances a patient undergoing treatment may complain that whilst his dysuria is lessening his frequency is increasing. Usually, however, a bladder of reasonable capacity remains. More rarely the bladder may contract down to a volume of 100 ml. or less. In such cases vesical spasm or urethral reflux may give rise to back-pressure renal atrophy. Before arriving at such a diagnosis one must, however, be quite certain that the renal dilatation is not secondary to the healing of ureteric lesions causing stricture formation.

Various operations have been devised for the relief of patients suffering from vesical contraction.

The bladder may be enlarged by anastomosing to it a segment of ileum, which has been isolated from the intestinal tract (ileocystoplasty). The isolated loop, which still retains its mesentery carrying its blood and nerve supply, may be joined to the bladder in a variety of ways. Commonly the proximal end of the intestinal loop is closed and the distal end anastomosed to an adequate opening made in the contracted bladder (cat-tail bladder). It is now more usual to split the segment along its unattached margin and to anastomose it as a patch to an extensive incision made into the bladder. More recently an isolated segment of sigmoid colon has been used for such procedures (colo-cystoplasty).

In some instances the vesical contraction may be so severe that reconstruction operations are impossible and relief may only be obtained by diverting the urinary stream. In such instances, and according to the surgeon's choice, the ureters may be transplanted into an isolated loop of ileum which drains into a collecting bag attached to the abdominal wall, into the sigmoid colon or into an isolated rectum.

Syphilis of the bladder is now rarely seen. In the secondary stage cystoscopy has shown the presence of vesical macules and papules which may break down into small ulcers. During the tertiary stage mild urinary symptoms varying from slight urgency to straining may occur. On cystoscopy the presence of mucosal œdema, false papillomas, gummas and gummatous ulcers have been described. The lesions heal rapidly under anti-syphilitic treatment.

CYSTITIS OF PARASITIC ORIGIN

Schistosomiasis (bilharziasis) of the bladder.—Vesical schistosomiasis is due to infection with the *Schistosoma hæmatobium* or, more rarely, with the *Schistosoma mansoni* or *japonicum*. The invading organism passes its sexual life in the human and the remainder in the fresh-water snail, *Bullinus contortus*. The condition is therefore endemic in areas where this snail exists and is infected. Among such areas are much of Africa—especially the Nile valley—and large areas of the Middle East.

The genito-urinary lesions are formed by the female parasite laying its ova in the terminal veins underlying the mucosa of the bladder and ureter. More rarely, ova are also deposited in the prostate, seminal vesicles and urethra of the male; the female genital organs are less commonly invaded. The live ova in the submucosa cause gross surrounding congestion and give an appearance which has been described as the bilharzial tubercle. Eventually they may be passed through the mucosa and voided in the urine. The bladder wall then heals. If the ova are not extruded they eventually die and give rise to much surrounding fibrosis. When untreated the infestation causes increasingly severe cystitis, which may be aggravated by the addition of secondary infection with pyogenic organisms. Gross ulceration, fibrosis and calcification of the bladder wall occur. Finally true tumour formation may arise in the grossly irritated bladder.

The history of possible infection and the cystoscopic appearances may suggest the diagnosis, which is confirmed by the identification of the characteristic ova in the urine. These ova are most commonly found in the last few

drops of urine squeezed out of the bladder at the first act of morning micturition.

Antimony potassium tartrate (tartar emetic) is the best specific drug for combating the disease. It is given intravenously in graduated doses, starting with 30 mg. and rising by increments of 30 mg. to a maximum dosage of 120 mg., up to a total of 1.2 g. The drug is toxic and great care must be taken with patients suffering from anæmia or from renal or liver diseases. Stibophen, an organic trivalent antimony salt which may be given intramuscularly, is less toxic but also less effective. 'Miracil-D', which is taken orally, is also less toxic but again less effective than tartar emetic.

Trichomonas vaginalis.—Trichomonads are commonly found in the vagina and may give rise to recurrent attacks of vaginitis. The infestation may spread to the urethra causing urethro-trigonitis. In the male the parasite may be found in the preputial sac, in the urethra, in the vesiculo-prostatic secretion and occasionally in the urine. Mild inflammatory changes may occur in the whole of the lower urinary tract due to its infection. Whilst it is questionable whether infection with *Trichomonas vaginalis* should be classified as a venereal disease there is no doubt that it may be transmitted by coitus: trichomonads have been found in the prostatic secretion of four out of five husbands, whose wives were infected. The diagnosis is made by immediate examination of a pipette specimen collected from the vagina or from the urethra preferably just before the first morning micturition.

The trichomonads are unaffected by the sulphonamides and antibiotics. Treatment in the female has consisted in the application of acetarsol and many other types of vaginal pessaries and jellies. In the male, prostatic massage and irrigation with 1:4000 oxycyanide of mercury or 1:5000 silver nitrate have been the usual line of action. Whilst these methods have often temporarily removed the organism from the vagina, urethra and bladder they fail to reach infestations in the para-urethral, Skene's, Bartholin's and cervical glands in the female and the seminal vesicles and prostatic glands in the male. Recurrence has therefore been common. It is also obvious that where intercourse is occurring both partners should be treated. The search for a successful systemic trichomonacide has usually been unrewarding. Recently, however, further hopes have been raised by the introduction of metronidazole (King, 1960; Scott-Gray and Murrell, 1961): with oral administration cure rates of up to 75 per cent. have been reported.

ABACTERIAL PYURIA

Abacterial urethritis is a well-recognized entity; when accompanied by conjunctivitis and polyarthritis it constitutes Reiter's syndrome. In the bladder an intense chronic cystitis may also occur in which the urine contains much pus, yet no pyogenic organisms can be recognized or cultured. *M. tuberculosis* cannot be isolated. On cystoscopy the bladder is contracted and intolerant. The bladder wall reveals the characteristics of a severe cystitis: hyperæmia, ecchymoses and occasionally ulceration. The diagnosis

is finally made by a process of exclusion. The etiology is uncertain: infection with a virus or a pleuro-pneumonia-like organism has been suggested. The cystitis tends to run a long and tiresome course but eventually clears. Sulphonamides and most of the antibiotics effect no improvement. Chlortetracycline (0.5 g. six-hourly) is claimed to be effective and should be the drug of first choice. In some, but not in all, cases intravenous arsenic cures the condition: e.g. neoarsphenamine, 0.3 mg. weekly for four weeks.

INTERSTITIAL CYSTITIS (HUNNER'S ULCER)

An account of the diagnosis and management of chronic infections of the bladder would hardly be complete without mention of this curious disease, which occurs chiefly in elderly women and may give rise to excruciating vesical discomfort, gross urgency and intense frequency of micturition. The symptoms simulate an intense cystitis but the urine is crystal clear, free from pus cells and sterile on culture. The lesion causing this intense spasm of the bladder is a non-specific inflammatory fibrosis occurring in the submucosa and later invading the muscularis. It is commonly single but on occasions may be multiple or even generalized. The etiology is unknown.

The diagnosis is made on cystoscopy. As a result of the intense spasm, the bladder capacity may be reduced to as low as 100 ml. or less. If gently filled through an irrigating cystoscope the mucosa often appears normal except for an irregular stellate area on the posterior wall or vault, which is slightly raised, pink in colour and covered by unbroken but keloid-like mucosa. With further filling the scarred mucosa may be seen to split, exposing the underlying muscularis and giving rise to intense bleeding. In other cases the lesions may be multiple. More rarely the whole bladder may have a parchment-like appearance. On filling the bladder segmentation occurs in the vessels and bleeding starts from myriad points all over the mucosa.

Treatment is very unsatisfactory. None of the urinary antiseptics, antispasmodic drugs, the corticosteroids or sex hormones appears to give any lasting relief. A local resection of the affected area is uncertain owing to the difficulty of identifying the lesion in the opened bladder and its known tendency to reappear in other areas. Fortunately, perurethral diathermy to the affected area with overdistension of the bladder often gives relief, which may last for months or even years. Sooner or later, however, the symptoms return and the treatment will have to be repeated. If the lesion progresses, excision of considerable areas of the vault and walls of the bladder and subsequent repair by performing either ileocystoplasty or colocystoplasty may give considerable ease. In extreme instances diversion of the urine either into an isolated loop of ileum or into the sigmoid colon may be necessary.

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THE ETIOLOGY AND TREATMENT OF GENITO-URINARY CALCULI

By J. P. MITCHELL, M.S., F.R.C.S., F.R.C.S.Ed.
Urological Surgeon, United Bristol Hospitals, and Southmead General Hospital

Stone remained one of the commonest disorders until well into the nineteenth century; in fact it is only in the last hundred years that the incidence of urinary calculi has fallen appreciably. This is even more noticeable in children, in whom calculus disease was once the most common surgical disorder. It is now a rare disease in children, and has diminished in incidence as the general health, standard of living and diet of children have improved. In some parts of the world where this improvement in diet and standards of health has not yet occurred, stone remains common.

COMPOSITION OF STONES

Phosphate and oxalate radicles are the basis of 90 per cent. of calculi and they may be in the form of calcium oxalate, calcium phosphate, or a mixture of the two. If the stone has formed in the presence of infection, in which urea-splitting organisms have produced a consistently alkaline urine, there will also be magnesium and ammonium phosphate.

The remaining 10 per cent. or less are due to various metabolic disorders, which can result in uric acid, cystine, xanthine and other rarer calculi. Uric-acid stones are found only in patients whose urine is constantly acid, and often this acidity is less than pH 5.5. No other consistent pH variation is found in urinary calculi.

Various methods of crystallography have been used in recent years to determine in greater detail the structure and composition of calculi. This has resulted in the identification of two distinct forms of calcium oxalate, each of which forms a calculus of characteristic appearance. Crystals of various calcium salts, both oxalate and phosphate, can appear in the urine in considerable quantities, even to the extent of producing a sediment of 'sand' but, before a calculus can develop, a matrix is required. This constitutes only a minute proportion of the calculus in weight and yet it is an essential part of the structure. This organic matrix consists of mucoproteins and mucopolysaccharides, besides numerous effete leucocytes, monocytes, bacteria, epithelial and smooth muscle cells.

FORMATION OF STONES

The factors which control the deposition of crystalloids to produce a calculus are not understood. Urine is capable of holding these crystalloids in a supersaturated solution, and visible precipitation is thought to be prevented by the presence of certain 'protective' colloids. If therefore the

concentration of these 'protective' colloids is too low, the salt precipitates out. Although this property of certain colloids can be demonstrated *in vitro*, the theory is still not supported by any evidence of reduction of colloids in stone-forming patients. In fact, some investigators believe that colloids are present in larger quantities than normal in the urine from patients with calculi. Further, mucopolysaccharides (i.e. one of the substances present in the organic matrix of the stone) are sometimes found in the urine of such patients.

Another suggestion is that the high solubility of these crystalloids is due to other constituents of the urine, which have hydrotropic properties; that is to say, these substances, of which urea and sodium chloride are examples, can increase the water-solubility of certain salts, normally not freely soluble in water. One of the constituents of stones on which this effect is most marked is calcium oxalate. Citric acid was thought to have this hydrotropic property, because a low level of citric acid has been demonstrated in urinary lithiasis. This reduced level, however, has only been found when infection was present, whereas stones in sterile urine have a normal level of citric acid. As bacteria will break down citric acid, its low level in infected lithiasis is probably a result of the infection, rather than a cause of the stone.

Even in patients who have metabolic disorders such as oxaluria, cystinuria, or a high urinary level of uric acid, it is impossible to blame entirely the urinary level of these metabolites for the formation of the calculus: for every patient with a cystine stone there are 50 others with as high a level of cystine in the urine who form no stones.

It can therefore be said that the cause of stone is still obscure; on the other hand, we know of many factors which can influence the production of calculi.

THE NIDUS OF THE STONE

Foreign bodies in the bladder always encourage the deposition of phosphatic incrustations. This may occur around a catheter that has been left too long in the bladder, or on some material introduced into the urethra for perverted sexual pleasure which ultimately finds its way into the bladder. Some patients form these phosphates much more quickly than others, but incrustations will occur to some extent in everyone. The laminated appearance of most calculi suggests a similar origin, in that the centre may have a different composition from subsequent layers. A small oxalate stone may have passed down to the bladder where it acted as a foreign body and phosphates were later deposited on its surface until the original identity of the stone had disappeared. Taking this one stage further, it is reasonable to assume that all calculi, whatever their chemical composition, start with a small nidus of microscopic size around which the salts are deposited. Examination of the central point in the laminations of stones has shown a variety of structures from amorphous debris to aggregated epithelial cells, or necrotic renal papillæ, or even clusters of bacteria—which at one

time led to the theory that all stones formed on an infected nucleus.

Minute concretions free in the renal pelvis may provide the nucleus for a stone. These concretions have been demonstrated (Carr, 1954) by microradiography of thin slices of kidney tissue. They may arise from Randall's plaques (1937), which are thin flat areas of calcification lying beneath the epithelium of the papillæ. Another possible origin is from the minute lymphatic sinuses lying in the fornix of each minor calyx. Carr has shown that microscopic concretions are present in these lymphatics and has suggested that they are usually washed away with the normal lymphatic flow. Occasionally these may ulcerate through the thin membrane separating the lymphatics from the calyx and then float out free into the renal pelvis.

FACTORS INFLUENCING THE FORMATION OF STONES

(1) *Hypercalciuria.*—Conditions which produce a high level of calcium in the urine can influence the development of stone. Although there is a higher incidence of stone when urinary calcium is high, many patients with hypercalciuria remain free of stones.

(*a*) *Hyperparathyroidism* can present with renal lithiasis and a high urinary calcium. The frequency with which this diagnosis is made varies from one urological centre to another, which indicates that the criteria are still uncertain. In primary hyperparathyroidism due to a parathyroid adenoma or hyperplasia there is a raised serum calcium consistently above 10.5 mg. per cent. The serum phosphate is low and typical bone changes may be demonstrable in x-rays of the hands. Secondary hyperparathyroidism can be induced by renal damage, and in advanced renal lithiasis the renal failure can reverse the phosphate level and a high result can be found. It may be impossible to determine which came first, the parathyroid disorder or the renal failure.

(*b*) *Other disorders resulting in demineralization of bone.*—Immobilization for a long period is often associated with rarefaction of bones, as can be seen on x-rays. The calcium removed from the bones can cause an increase in the calcium in the urine.

(*c*) *Diet.*—It can be shown that the majority of individuals cannot vary the amount of calcium excreted in their urine by any dietetic extremes. There are, however, some who can produce a marked hypercalciuria by an excessive intake of milk or cheese, both of which have a high calcium content. Vitamin D, when given to small children in large doses over a long period, can cause so great an absorption of calcium from the small gut that the calcium in the urine can be appreciably increased.

(*d*) There is still a group in whom the urinary calcium is high and yet no cause can be traced. These idiopathic cases must be considered as an entity, partly because of their significant number, but also because they, too, have a higher risk of stone formation.

(2) *Concentration of urine.*—Certain parts of the world are recognized as stone-forming areas. In the United States part of Florida is described as

the 'stone belt'. This is due to the hot climate combined with a poor fluid intake and consequent concentration of the urine. It need hardly be stated that precipitation of salts is more likely to occur in concentrated urine. Visitors coming to these areas are usually the first affected, presumably because the local inhabitants automatically compensate by drinking more. The passage of small ureteric calculi was common among British troops in the Middle East during the war, and every surgical ward had at least one patient with renal colic, who was either passing, or had recently passed, a small stone.

(3) *Stagnation.*—Any mechanical factor impairing the free flow of urine in any part of the urinary tract will predispose to stone. This may be a minor deformity in one calyx with consequent poor drainage, or it may be a more obvious abnormality such as a large diverticulum of the bladder. Prostatic obstruction can result in vesical calculi, and in a similar way bladder-neck hypertrophy can also give rise to stones higher in the urinary tract. In addition to the demineralizing effect on the bone when patients are kept in bed for long periods, stagnation of urine in dependent calyces can also contribute to the development of calculi, but once again it is possible to show that some patients can lie immobilized for weeks and yet show no signs of calculi. Nevertheless, it is a wise precaution to turn these patients in bed daily, and this has been shown to reduce the incidence of recumbency ('decubitus') calculi.

(4) *Infection.*—Persistent urinary infection can aggravate stone formation in two ways. In the first place, the urea-splitting organisms maintain an alkaline urine which is favourable to the development of mixed phosphate (magnesium ammonium phosphate) stones and, secondly, nearly all bacteria secrete mucopolysaccharides which are one of the constituents of the organic matrix of the stone.

INVESTIGATIONS

Before considering treatment, it is necessary to assess the function of both kidneys by intravenous pyelography, and to see if a stone is causing obstruction and thereby any back-pressure. A full biochemical investigation of blood and urine will exclude an underlying metabolic disorder. Finally, a cystoscopy will reveal any site of urinary stagnation such as a diverticulum or obstruction at the outlet of the bladder which may be a contributory factor in the formation of the stone. Clearly, full investigation to this extent is not necessary in every patient who develops a single urinary calculus, but bilateral, recurrent, or multiple calculi in one kidney all deserve full investigation.

VESICAL CALCULI

Methods of treating stones in the bladder have been described in medical writings for over 2000 years. In fact, it is the only operation specifically mentioned in the Hippocratic Oath. The first detailed description of lithotomy appears in the ancient Indian writings of Susruta 1,500 years ago where the method differs little from the operation which was still in

use in the eighteenth century. In mediæval times this operation was performed by itinerant lithotomists, who travelled with performers, freaks, pedlars and others who appeared at the county fairs. Their mortality rate from the operation is reported to have been anything from 30 to 50 per cent. In France a great attempt was made by Frère Jacques to reduce this high mortality. In England the peak of success in this operation was reached by William Cheselden, who reduced the time of operating from just under one hour to just under one minute. The value of swift surgery in those days was borne out by the dramatic improvement in the mortality figures. Cheselden claimed to have performed 30 operations in succession without a death.

Today vesical calculi can be removed, either by crushing ('litholapaxy') or by suprapubic lithotomy. If the bladder has to be opened for any other reason, such as diverticulectomy or prostatectomy, obviously the stone can be removed at the same time. Otherwise suprapubic lithotomy is reserved for those patients in whom the stone is so large that it cannot be gripped by the jaws of the lithotrite.

Two forms of lithotrite are still in use. The viewing lithotrite has a telescope alongside so that a cystoscopic view of the stone and the crushing blades can be obtained. As this lithotrite has to accommodate a telescope it has certain limitations in strength of construction for crushing hard stones. Larger stones are more easily crushed with the old blind lithotrite, as the size of the stone makes it easy to obtain a good grip. In any case, after the first bite the urine is so full of cloudy debris and fine dust from the crushing that a second or third view is unlikely to be possible.

The cause of the vesical calculus must then be sought, as stones are unlikely to occur in the bladder without some demonstrable obstructive factor such as prostatic adenoma or hypertrophy of the bladder neck. Even a calculus passed down from the kidney will usually pass on down the urethra spontaneously unless obstruction is present.

STONE IN THE KIDNEY

This presents a more complex problem, first in etiology, which is always more obscure than in vesical stones, and secondly in its surgical removal.

A small stone less than 1 cm. in diameter lying in a minor calyx is rarely responsible for renal pain, and may be difficult to find at operation even with radiological control in the operating theatre. Such a stone can remain unchanged in shape, size or position for many years, and would not seem to justify exploration of the kidney. Regular radiological review at six-monthly intervals for two to three years by a straight x-ray of the abdomen is all that is necessary.

A stone in the renal pelvis must be removed when it is obviously too large to pass down the ureter spontaneously. Larger stones in this position, possibly with staghorn extensions into the calyces, can easily crumble during extraction and great care has to be taken to see that no fragments

have been left behind. Here radiological control in the operating theatre can be invaluable, using needle markers in the kidney substance as guides to locate the smaller pieces. An electrode on the tip of a fine bougie has been used with a hearing-aid amplifier; this gives a distinct click or rasping noise as the electrode makes contact with the calculus. Although in theory this electrical probe appears valuable, in practice its use is very limited.

Large staghorn calculi or multiple stones filling calyces and pelvis present the problem of how far conservative surgery can go, and whether nephrectomy will not give greater relief to the patient in the long run provided the opposite kidney is healthy. This can often be assessed only at operation when the degree of chronic pyelonephritis and thinning of the renal cortex can be observed directly.

Bilateral renal calculi demand conservative surgery. If these can be removed from both sides without inflicting too much damage on the renal substance, then complete clearance of the stones should be attempted. On the other hand, a patient whose kidneys are already seriously diseased, may live longer if his kidneys are left untouched until either pain or further complications such as pyonephrosis demand surgery. To remove a large staghorn calculus from a kidney is possible as a surgical feat, but will certainly do considerable injury to the renal substance; it is often suprising how long a patient with advanced bilateral renal lithiasis can survive in a comfortable condition.

Various substances have been irrigated through the renal pelvis via ureteric catheters and nephrostomy tubes but, except for washing away debris and 'phosphatic mud', there is no convincing evidence that calculi have decreased in size.

URETERIC CALCULI

Stones in the ureter, on their way from kidney to bladder, may remain for many months in the same position and give little trouble. So long as there is no back-pressure on the kidney, the patient is not having too much pain, and the stone is not increasing in size, it can be observed in the optimistic hope that it will pass spontaneously. The patient should be encouraged to lead a normal active life and to drink copiously; he should be told that ureteric pain indicates possible movement of the stone in the right direction. Stones have been known to remain symptomless in the same position in the ureter for two years and yet subsequently pass of their own accord. The indications for surgery are back-pressure on the kidney as shown on intravenous pyelography, distinct increase in size of the stone to form the typical date stone of the ureter, or recurrent intolerable ureteric colic with no movement of the stone.

Various devices have appeared from time to time for extracting stones from the ureter. Some surround the stone with a twisted coil of wire; others ensnare it in an expanding wire basket or cage. Most of these contraptions are successful occasionally, but they are not without risk of ureteric perforation or complete impaction. Any stone which will pass

easily with a stone extractor would probably pass spontaneously in the near future.

Supersonic vibration presents a hope of destroying these stones *in situ* by passing a fine insulated rod up the ureter and disintegrating the stone immediately it makes contact, at the same time having no effect on the surrounding soft tissues. So far this idea has not been tried on ureteric calculi in man.

URETHRAL CALCULI

In the prostatic urethra a stone may impact from the bladder above or by ulceration of a prostatic calculus into the posterior urethra. This is removed by dislodging it back into the bladder where it is crushed and evacuated. Lower down the urethra stones may impact in the navicular fossa. A general anæsthetic is usually necessary to enable them to be extracted, and an external meatotomy may be required.

PREVENTION OF RECURRENCE OF CALCULI

What advice should be given to the patient who has passed a stone? Various diets have been recommended to these patients in the past. Some of the diets are directed at excluding any substance which is found in urinary calculi, whilst other diets, such as the 'acid ash diet', attempt by drastic restrictions to alter the urinary pH. Some of these diets have been so harsh that nearly every tasty ingredient of the food has been excluded. Other patients have been advised to boil any hard water before drinking it. There is not a shred of scientific evidence, however, to support any of these dietetic theories. After correcting any pre-existing metabolic disorder such as gout or hyperparathyroidism or other causes of hypercalciuria, there are only two factors which are of proven value in reducing the risk of further lithiasis.

The first is infection which must be treated under regular laboratory control for sensitivities, and if necessary attacked by long-term treatment with an appropriate antibiotic or bacteriostatic drug.

The second, and obvious advice to give, is to increase the fluid output, as precipitation of salts is more likely to occur in concentrated urine. If this is explained to the patient he should be advised to try at all times to produce urine which is so dilute that the yellow tinge is scarcely visible. This applies to night as well as day, and the patient should be encouraged to have a glass of water by his bedside every night, and a minimum should be set of five pints (3 litres) in twenty-four hours. Perhaps the best example to follow is that of the historic patient, Samuel Pepys, who was cut for stone in the year 1658 and celebrated this ordeal annually with his relatives and most intimate friends. Subsequently he never appeared to refuse any invitation at any time of the day to take tea or other fluid refreshment with his friends.

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POLYCYSTIC DISEASE OF THE KIDNEYS

By B. W. T. PENDER, M.B., F.R.C.S.
Surgeon, Chelmsford Group Hospitals

Polycystic disease of the kidney is almost always bilateral (fig. 1), but the degree of involvement of each side may show considerable variation in both the gross and histological appearances of the kidneys. Sometimes they are smaller than normal but much more commonly they show considerable enlargement. There is a tendency for the condition to run in families.

It is unusual for congenital polycystic disease to cause much in the way of symptoms before the twenties, but occasionally the condition is so gross that death occurs soon after birth. There appear to be two main forms of the disease. By far the more common form shows elongation and dilatation of the renal tubules with many normal glomeruli and Bowman's capsules; in this type there is increase in the connective tissue of the kidney. In the second, and much rarer, form the cysts are due to dilatation of Bowman's capsules with normal tubules, and here the connective tissue is normal in amount.

ETIOLOGY

There is little, if any, value in attempting to explain the cause of polycystic disease by any of the many theories, but it is probably true to say that the majority of cases are caused by a maldevelopment in the tubules with consequent fluid accumulation. The presence of cartilage and new blood vessels of a primitive type does not have to be explained on developmental grounds as this state of affairs can be produced experimentally by obstructing the flow of urine from a normal kidney. The earlier theory that the cysts were due to a malunion of the metanephric elements which form the glomeruli with the primitive ureter is no longer tenable.

CLINICAL PICTURE

As the average age of death is in the early part of the fifth decade, it is not surprising that in earlier life there may be no symptoms at all.

Vague abdominal discomfort, which may amount to pain, is the earliest symptom in most cases and may be due to the weight of the kidneys and their expansion. This pain normally takes the form of a lumbar ache, but vague epigastric symptoms may be apparent which may mislead the clinician. In general, it would be fair to say that in the early stages the pain of this condition is one of the many causes of vague lumbar backache.

Hæmaturia is much more common than is generally realized and is painless unless the quantity of blood passed is sufficient to cause clot colic. It may be violent. It may be frequent or occur at long intervals. Red cells in the urine on microscopy are a common finding: these are nearly always

present when symptoms are established and they may be present long before, thus bringing the condition to light. A cystoscopy during the bleeding phase is most useful and will determine the offending side.

Hypertension is a late manifestation of the disease but is usually well established by the time death is imminent. It is seldom severe, may never occur at all, and is valueless in prognosis.

Proteinuria is common, occurs early, and is found in about two-thirds of cases when first diagnosed. It is always present in advanced cases.

Palpable kidneys.—The ability of the clinician to palpate the kidneys varies with the cooperation of the patient and the size of the sufferer and his

FIG. 1.—Polycystic kidneys. This patient died of uræmia—the diagnosis was made at necropsy.

kidneys. Not all polycystic kidneys are grossly enlarged, and some are barely enlarged at all. In the majority of patients, however, the kidneys are palpable by the time symptoms have appeared, although they may not always be easy to feel. It is sometimes said that they are more readily palpable in the female, and this is probably due to the fact that women breathe more with the chest and have less abdominal musculature.

Renal infection is not an uncommon finding and it seems that polycystic kidneys are more prone to infection than normal kidneys, presumably due to stagnation; the offending organism is usually coliform. Occasionally *pyuria* without a demonstrable organism is met with, and should be borne in mind if infection with *M. tuberculosis* has been excluded.

Stone formation.—This complication is rare. Stones may be found by accident early in the disease process but the onset of renal colic from a stone fragment passing on can occur. Urography will enable the diagnosis to be made.

Uræmia.—The onset of this sinister state is often insidious. Often a patient with polycystic disease, found by accident, and with minimal or absent

symptoms, has a blood urea of over 50 mg. per cent. In fact, patients seem to get used to this mild uræmia and may be troubled very little by even moderately severe degrees. Frequent headaches may herald this condition and when renal failure is established nausea and vomiting make their appearance and the resulting anorexia is followed by weight loss and weakness. In the final stages secondary infections are common and pneumonia usually terminates the life of the patient. Death occurs approximately ten years after the first symptoms make their appearance, and the general picture is one of slow renal failure due to compression of renal tissue by the gradual enlargement of the many cysts.

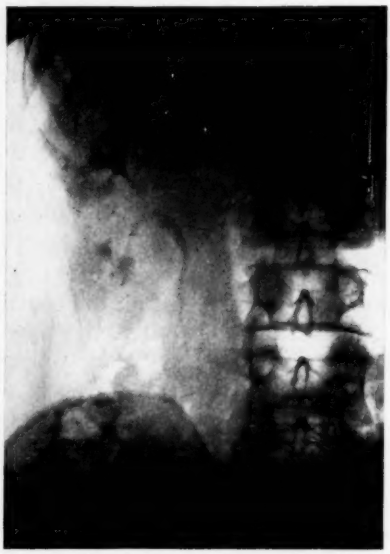

FIG. 2.—Intravenous pyelogram showing a polycystic kidney. Note the increased size, spreading of calyces, and denting of dye shadow, particularly at the lower pole.

DIAGNOSIS

Clinically the presence of a chronic nephritis with a palpable kidney or kidneys should lead to examination of the urine for red cells, proteinuria, casts and perhaps pus cells. Later, excretion pyelography confirms the diagnosis which may have been suspected even after a plain x-ray.

Plain abdominal x-ray.—In most cases a plain straight film focused well on the psoas shadows should outline a kidney except in the presence of abnormal obesity or excess gas in the intestinal tract. The length of the kidney is important as this dimension is usually noticeably enlarged bilaterally. The presence of a crenated outline of the kidney on both sides is much less often visible but is diagnostic.

Excretion urography.—The typical appearance is one of elongation, tortuosity and spreading of the calyces bilaterally; when accompanied by denting of the dye shadow by cysts (fig. 2), this is absolutely diagnostic. The cysts may even indent the pelvic shadow and dye in dilute form may occasionally be seen in a cyst or cysts. Difficulty arises when the disease is more pronounced on one side, giving an abnormal pyelogram on one side only. This leads to a diagnosis of tumour of the kidney and, if ascending pyelography is of no help, exploration of the kidney is performed. At least this confirms the diagnosis and is better than diagnosing a case of 'hypernephroma' as unilateral polycystic disease. Percutaneous puncture of cysts with injection of dye medium has been performed, but on general principles is inadvisable.

If the diagnosis is so equivocal, exploration in order to exclude a tumour would seem more sensible provided that if the diagnosis of tumour is proved wrong the temptation to excise the kidney is resisted.

Ascending pyelography.—This has a place in confirmation of the diagnosis in suspected cases, but great discretion must be exercised. In order to diminish the risk of renal failure, only one side should be injected at a time. Ascending pyelography is sometimes useful in confirming that the disease is bilateral, and, when excretion pyelography has shown cysts on one side only, should be performed on the so-called 'normal' side.

Aortography will often clarify a diagnosis still in doubt. Blood vessels will be deformed, and the cortex of the kidney be irregular due to the numerous cysts (the so-called 'worm-eaten' appearance). A thickening of the renal cortex, a common finding in polycystic disease, must be looked for.

Tomography.—Tomography, which carries no risk to the patient, may define the unusual outline should other x-rays be equivocal.

PROGNOSIS

There are great variations in the course of the disease. In many people there are no symptoms at all when the disease is first discovered; in others the disease process may remain stationary for a number of years, whilst in a third group renal failure appears soon after the first symptoms and a fatal outcome is rapid. It is impossible to give an accurate prognosis before renal failure has started, but once symptoms occur death usually supervenes within ten years. A raised blood urea is a serious finding and death can be expected within four years. Men appear to die younger than women (Dalgaard, 1958). The majority of cases are dead before the age of sixty, and many die in their forties and fifties.

TREATMENT

Treatment is unsatisfactory and no-one has yet been able to establish to everyone's satisfaction whether *operative treatment* improves the prognosis. In 1911, Rovsing published his work on multiple cyst puncture; he was impressed beyond doubt that there was an improvement in renal function following the operation which now bears his name. The rationale of multiple cyst puncture lies in the belief that renal function is impaired by pressure from the cysts. Rovsing stressed that the operation was not curative and that a fatal termination must be expected, although the end may be delayed and the pain relieved. The operation still has many advocates, but the possible hazard of renal infection or urinary fistula must be borne in mind as either of these may necessitate nephrectomy. The advent of modern antibiotics has obviated this danger to a marked extent.

There are numerous writers who are strongly against operative intervention and feel that the less surgery performed the better. My own opinion is that a definitive operation to puncture cysts is not advisable except for unbearable pain and I only perform the operation when a kidney has been

explored for a mistaken diagnosis. The operation is then confined to the one side, and when combined with high lumbar or renal sympathectomy cures pain. One must be absolutely certain of the diagnosis once the kidney has been exposed and be aware of the possibility of a cystic degeneration in a tumour. Kidneys with multiple cysts are only very rarely complicated by neoplasms so that nephrectomy is seldom indicated—a polycystic kidney is better than no kidney at all. The rare problem of severe uncontrollable hæmorrhage is about the only absolute indication for nephrectomy after the correct side has been determined by cystoscopy. Severe infection with abscess formation with or without a calculus may constitute an indication for surgery. Symptomless calculi should be ignored.

The ***medical treatment*** consists in treating infection with antibiotics and treating the uræmia and acidosis by alkalizing the urine. A watch should be kept on the electrolytes, and extra potassium may have to be administered orally. If vomiting occurs, sodium chloride replacement may be necessary. Anæmia must be corrected. There is no evidence to suggest that treatment of hypertension, if present, is of any value, but heart failure is treated along the usual lines. Patients should be advised to have a high fluid intake and avoid exposure to cold and infections, to which they appear to be more liable.

THE POLYCYSTIC KIDNEY AND PREGNANCY

Owing to the age at which polycystic disease usually becomes apparent it follows that many women remain symptomless during the childbearing years; the disease may become established years later after normal deliveries. A family history of the condition may be the only clue to its presence. There is no evidence to show that pregnancy hastens the development of cyst formation. Should a woman be known to have polycystic kidneys there is no contraindication to pregnancy even if she has symptoms, although it would seem wise to advise her to have her children early and to put her on a low-salt diet. If there are any signs of renal insufficiency or marked hypertension pregnancy should be discouraged. If these same stigmata of the disease appear in pregnancy, then early termination is recommended. A rise in blood pressure and albuminuria are the danger signs.

ASSOCIATED DISEASES

The presence of liver cysts at necropsy is not an uncommon finding in patients dying of renal failure due to polycystic disease of the kidney. This association has been placed as high as 16 per cent. It is evident therefore that there is some connexion in the etiology. It seems, too, that aneurysms of the circle of Willis occur more commonly in polycystic renal disease than is normal for the population. This has led to a hypothesis that a single gene is the cause of these three malformations (Dalgaard, 1958).

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RENAL TUMOURS

By M. F. NICHOLLS, C.B.E., M.Chir., F.R.C.S.

Director of the Surgical Unit, and Surgeon in charge of the Urological Department, St. George's Hospital

In this article I propose to deal with four types of primary neoplasm of the kidney: adenocarcinoma of the renal cortex, tumours of transitional epithelium, Wilms' tumour, and hæmangioma. Secondary metastatic deposits in the kidney from neoplasms elsewhere in the body are occasionally found at necropsy. They rarely give rise to significant symptoms in life and their diagnosis is of purely academic interest.

ADENOCARCINOMA

By far the commonest primary tumour of the kidney is the adenocarcinoma of the renal cortex, which accounts for 75 per cent. of all renal neoplasms. This tumour was ascribed by Grawitz, in 1883, to the development of neoplasms in adrenal 'rests' in the kidney, hence the familiar name of 'hypernephroma'. Later it was shown by Nicholson (1923) to have its origin in the renal tubules—a view that is now universally held. Typically the tumour has a characteristic histological pattern, both in the primary mass and in the secondary deposits. Even when more anaplastic forms are found they are usually easily recognizable. In its natural history, too, the tumour has a constant pattern of behaviour. Although there are several different types of behaviour, these are repeated singly or in combination in the majority of cases.

Although no age is immune (I have dealt with a case in an infant of 22 months), by far the commonest age is between 50 and 70 years. Men are affected almost twice as commonly as women.

DIAGNOSIS OF ADENOCARCINOMA

The disease shows itself first by *hæmaturia* more often than by any other symptom, but it is not always realized that this happens in little more than half the cases, and the absence of bleeding in no way invalidates the diagnosis. *Pain in the loin* and the presence of a palpable tumour are also common. Indeed, hæmaturia, pain and tumour, either alone or in combination, are present in the majority of cases. This, however, leaves a substantial minority which present with diverse symptoms and signs. A sign which is not at all uncommon and which may give rise to great difficulty in diagnosis is *pyrexia*. Whilst this may be present with any of the symptoms already mentioned, particularly that of pain, it may occur alone. Many patients have remained undiagnosed for long periods while elaborate investigations to find the cause of 'pyrexia of unascertained origin', such as Widal tests and repeated blood cultures, were undertaken. As a cause for

otherwise symptomless pyrexia, renal carcinoma should always be borne in mind. An interesting side-effect of these tumours which is occasionally seen is *polycythæmia* with a raised red-cell count and hæmoglobin. The cause of this is now generally regarded as being a hormone produced in the tumour which acts directly as a stimulant to the bone marrow. *Hypertension* is occasionally seen but the relationship between this phenomenon and the tumour is not fully established.

A few of these tumours are completely silent or symptomless, whilst an equivalent number show themselves only by the presence of *secondary deposits*. Renal adenocarcinoma has a predilection for hæmatogenous spread. This is probably associated with the fact that the tumour commonly invades the large veins of the kidney, including the main renal vein itself (fig. 1). The commonest site of a secondary deposit is naturally the lung, but nearly as common is a deposit in the skeleton, with or without obvious deposits in the lung. It is, in fact, the effects of these bony deposits, such as spontaneous fracture or root pain from spinal metastases, which most often call attention to a silent tumour of the kidney. A well-known pattern of behaviour of these tumours is that a metastasis may appear to be a solitary one for a long time, even for twenty years. This phenomenon is most commonly seen in the skeleton, but it has been observed in the lung and the brain. In addition to these sites, the liver is fairly often involved both by direct spread and by blood-borne metastasis. In a small number of cases, a metastasis has been known to take root in the opposite kidney.

FIG. 1.—A large renal adenocarcinoma. Note the renal vein packed with tumour, on the right.

Spread by the lymphatics is nothing like so constant a feature as in most other forms of carcinoma, but in a substantial number of cases the para-aortic and other glands are affected. The appearance of an acute varicocele on the affected side is notorious, but the rare cases in which it occurs are usually advanced ones and as a diagnostic sign it has little importance.

Methods of investigation.—In a suspected case of adenocarcinoma, the diagnosis, as with other renal tumours, is usually made by ***radiology***. The tumour often distorts the normal shape of the pelvis or calyces of the kidney to a greater or lesser degree. This can often be seen on an intravenous pyelogram (fig. 2), although sometimes such poor function is left to the kidney that a retrograde pyelogram is necessary for clear definition. Occasionally the tumour is too small or too peripheral to alter the shape of the calyces and other methods have to be used. One of these is a renal

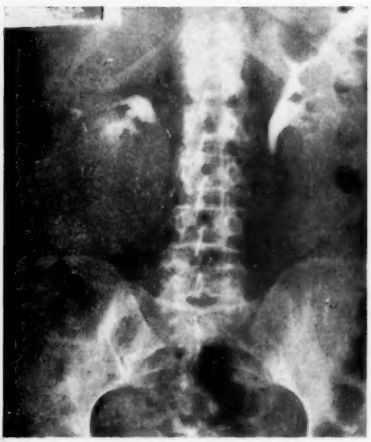

FIG. 2.—An intravenous pyelogram showing distortion of the pelvis and calyces on the right. The tumour can be seen as a soft-tissue shadow.

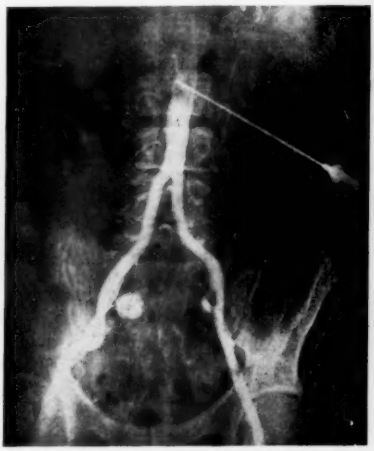

FIG. 3.—An aortogram in a case of ischæmia of the lower limb which revealed an unsuspected left renal carcinoma. Note the 'pooling' of blood in the tumour.

angiogram which will characteristically show an irregular pooling of blood in the area of this usually very vascular tumour, and will also help to distinguish between an adenocarcinoma and a simple renal cyst, which is avascular (fig. 3). The outline of a suspected tumour can occasionally be picked up by a tomogram (fig. 4). It must be rare for a tumour of any size to escape these searching radiological methods.

The fact that they occasionally do so, emphasizes the importance of another method of investigation: *cystoscopy* of a patient with hæmaturia as an emergency while bleeding is actually taking place. This not only excludes the bladder as a source of bleeding, but may determine, by observation of the ureteric orifices, from which kidney the bleeding is coming. This may be of the utmost importance when planning treatment.

TREATMENT OF ADENOCARCINOMA

In deciding the treatment to be undertaken and indeed in assessing the results of such treatment, certain considerations have to be taken into account. Within the patterns already described the behaviour of these

tumours is very varied and indeed capricious. Some remain localized and comparatively benign for years. Others in their growth involve the surrounding tissues, sometimes massively, making their surgical removal difficult or impossible. It is probable that by the time they are diagnosed the majority have given rise to distant blood-borne metastases. As has already been said, such metastases may be apparently single, at least for long periods, and there are many recorded examples of removal of the primary tumour and of a single metastasis which has resulted in long-term survival. There are, in fact, well-documented cases of actual regression of metastatic deposits from adenocarcinoma of the kidney following the removal of the primary tumour and without other treatment. This is particularly true of secondary deposits in the lung (Hallahan, 1959; Nicholls and Siddons, 1960). For all these reasons, it is right that, except in the most advanced and obviously inoperable cases, nephrectomy should be done even when secondary tumours are known to be present. Following nephrectomy it is quite often justifiable to eradicate an apparently solitary deposit when this is accessible to surgery. Long-term successes have followed removal of such deposits from the brain, the lung and the skeleton. Occasionally, removal of the primary mass is justified as a palliative measure for the relief of pain, even though no lasting cure can be expected.

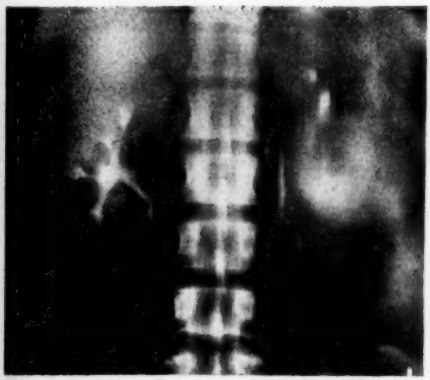

FIG. 4.—A tomo-pyelogram which showed a left renal tumour in a case of 'pyrexia of unascertained origin'.

Radiotherapy has some part to play as an adjunct to surgery, either pre- or post-operatively. As a sole means of treatment for either primary or secondary tumours its results have been disappointing.

TRANSITIONAL-CELL TUMOURS

Another type of neoplasm, accounting for about 12 per cent. of all renal tumours, arises from the transitional epithelium of the calyces or pelvis. It takes various forms both macroscopically and microscopically, but it is seldom wholly benign. It may be mainly papilliferous, growing out into the lumen of the pelvis or calyx (fig. 5), or it may be mainly infiltrating; often it is a mixture of both. Occasionally, by metaplasia, there is an alteration to squamous epithelioma, particularly in the presence of some irritating factor such as renal calculi. In spite of evidence that some at least of these tumours are provoked by the excretion of a carcinogen, acquired either from working

in certain industries or from some error of metabolism, it is odd that the condition is practically never bilateral. The age incidence is much the same as that of adenocarcinoma of the kidney, but tumours of transitional epithelium are four times as common in men as in women.

Concurrently or subsequently, tumours commonly develop in the lower end of the ureter and also in the bladder. Outside the urinary system their spread is almost equally by the lymphatics and by the blood stream. Although with early diagnosis and adequate treatment many cases survive for long periods, on the whole the prognosis is poor.

FIG. 5.—A papillary transitional-cell carcinoma filling the upper half of the pelvis and the upper calyces.

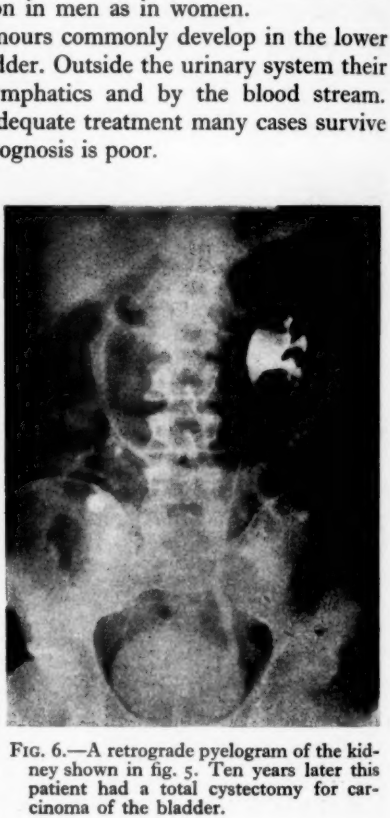

FIG. 6.—A retrograde pyelogram of the kidney shown in fig. 5. Ten years later this patient had a total cystectomy for carcinoma of the bladder.

Diagnosis.—The commonest symptom which brings them to notice is understandably hæmaturia and this is the sole symptom in about half the cases. The majority of the others show hæmaturia and pain. Very few have a palpable tumour. Pain is of two types: either ureteric colic due to the passage of clot down the ureter, or pain from distension of the pelvis or calyces caused by the obstructive nature of the growth. Such obstruction is not uncommonly complicated by infection and occasionally by the formation of calculi.

It is in the transitional tumours of the kidney that the thorough investigation of all cases of hæmaturia, however short-lived or otherwise symptomless, is of the greatest importance. The investigation, of course, includes cystoscopy, and intravenous and retrograde pyelography. The latter

manœuvre is essential when, as not uncommonly happens, the disease has suppressed the function of the kidney. The characteristic x-ray picture is that of a filling defect in the pelvic or calyceal shadow, due to the presence of a tumour (fig. 6). Ulceration of the calyces may be seen with the more infiltrating types of tumour.

Treatment.—This should always be radical and should consist of the removal of the kidney and the whole of the ureter down to the bladder. If part of the ureter is left behind neoplasm will develop in the lower end in a significant number of cases, sometimes even after an interval of several years. In the follow-up of these patients regular cystoscopy must be done because it is no unusual thing for transitional-cell tumours to develop in the bladder at a later date. In one such patient of mine the bladder had to be removed for carcinoma over ten years after the original nephrectomy (fig. 6).

NEPHROBLASTOMA

The Wilms' tumour, or nephroblastoma, is derived from primitive cells, the precursors embryologically of the adult kidney, as its name implies. As might be expected, it occurs in the first few years of life and is rarely seen after the age of seven. It is by far the commonest intra-abdominal tumour at this age. Unfortunately, as it is commonly symptomless, the tumour may be present for a long while before it is discovered. It may grow to a large size and may have invaded other tissues locally or spread to distant parts by the time the diagnosis is made. Metastatic spread by the blood stream is common and the lungs and liver are the most common sites of secondary tumours although no part of the body is immune. Lymphatic spread also is often seen. The tumour has a highly malignant potentiality and less than half the cases survive for any substantial period, with or without treatment.

Diagnosis.—Only about one in five show hæmaturia or pain. The rest are discovered by the finding of an abdominal mass. The word 'abdominal' should be stressed, for in these infants and young children the renal tumour does not fill the loin but moves forward and across the abdomen. In spite of this, however, its renal origin is usually obvious. Intravenous pyelography may be helpful, but is not always so. Sometimes the tumour has so widely replaced the kidney that no renal function is present. At other times a normal or fairly normal pyelogram may be seen.

Treatment.—The mere presence of such an abdominal tumour, whatever its nature, demands treatment and, whenever possible, this is by surgical excision which should be undertaken at the earliest possible moment. Delay, and especially handling of the tumour, add greatly to the risk of metastases and only in cases in which a large tumour appears obviously to be inoperable should surgical removal be delayed in order that preoperative radiation may be tried. This sometimes has the effect of shrinking the tumour sufficiently to allow of surgical excision. At operation some indication of the prognosis may be obtained from the size of the tumour and particularly the ease of its complete removal. Postoperative irradiation is usually

employed although opinions differ as to its influence on the ultimate result.

An extreme example of early diagnosis was shown by a small boy who at the age of five sustained a trivial injury in the loin which was followed by profuse hæmaturia and a mass. At nephrectomy the hæmorrhage was found to be due to the rupture of a small Wilms' tumour which could not possibly have been detected otherwise. This happened over five years ago and the boy is still in excellent health (fig. 7).

HÆMANGIOMA

Hæmangioma of the kidney, usually of the pelvis or calyces, is a neoplasm which does not occur very often but which, when it does, provides a difficult and baffling problem requiring great care in investigation, and judgment in treatment. The difficulty is that no symptoms or signs other than repeated hæmaturia are present in this type of case and the diagnosis must be arrived at by a process of exclusion. As these tumours are flat and superficial there is no distortion of the pelvic calyceal shape on pyelography, although occasionally retained blood clot may produce an apparent filling defect of the pelvis. Such a kidney will look and feel normal when fully explored and mobilized in the loin. An exploration in this case is almost certainly bound to culminate in a nephrectomy. The presence of minute angiomas may account for some cases of so-called essential renal hæmaturia. The final diagnosis depends upon the cystoscopic observation of blood coming from one ureter in the absence of any other ascertainable cause. These neoplasms are not malignant in the ordinary sense of the word, but their removal may be essential on account of repeated and severe bleeding, sometimes necessitating replacement by blood transfusion.

FIG. 7.—A Wilms' tumour successfully removed from a boy aged 5 years.

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THE NORMAL AND THE NEUROGENIC BLADDER

By DONALD MUNRO, M.D., F.A.C.S.
Consultant in Neurosurgery, Boston City Hospital, Boston, Massachusetts

An understanding of the changes associated with the symptoms manifested by a neurogenic bladder can only be reached when the physician is familiar with the normal neurophysiology of the urinary bladder in man. This is fundamental to his ability to recognize and interpret the resultant neuropathological alterations in its activities.

THE NORMAL BLADDER

The normal physiology of the human urinary bladder was first clearly delineated by Denny-Brown and Robertson in 1933. Their work was supplementary to, and based upon, the observations made by Sherrington (1900) and Starling (1900). No significant contribution to the problem has been made since, although many thousands of cystometrograms and hundreds of sphincterograms have amplified their work as well as correlated the normal with the abnormal physiology.

MECHANISM OF THE NORMAL BLADDER

Filling mechanism.—The bladder is filled by urine propelled through the ureters and moved by peristalsis. It enters the cavity of the bladder under positive pressure. Back-flow up the ureters is prevented by a valve-like mechanism and action at the uretero-vesical junction. The urine is delivered irregularly in small amounts of the order of less than 90 drops per minute. Escape of urine from the bladder is prevented by the constant contraction of both urethral sphincters during filling.

If it is not interfered with by the psychological inhibition of an emptying contraction of the bladder wall or by voluntary contraction of the external urethral sphincter, and is otherwise normal, each bladder has a critical amount of 'fill' or capacity. This fill initiates an 'emptying' contraction which completely empties the bladder of urine as described below.

Storage mechanism.—The bladder stores urine up to the point of an individual 'critical fill' by virtue of the constantly contracted state of the urethral sphincters. These act in opposition to the stretch reflexes of the smooth muscle of the detrusor. This arrangement permits periods of relaxation with stretching and subsequent potential emptying contractions which may become emptying in fact. If this does not happen the former are immediately succeeded by a resulting increase in the cubic capacity of the organ. This stretch mechanism continues until the critical fill is reached, when the bladder empties as described below.

Emptying mechanism.—When the critical fill has been collected in a

normal bladder and no psychological or voluntary impediment is present to interfere, the detrusor muscle contracts, raises the intra-vesical pressure and squeezes the contained urine. At this point, the proximal part of the urethral sphincter (the so-called internal sphincter) relaxes, being stimulated thereto by a motor impulse activated by this sensory stimulus. This permits urine to flow into the proximal urethra. The presence of urine in this part of the urethra serves to initiate a second sensory impulse which, in its turn, propagates a motor response that relaxes the distal part of the urethral sphincter (the external sphincter) thus permitting free escape of urine through the meatus. These basic and essential reflex activities are aided by the contraction and elevation of the perineal muscles.

The first reflex is mediated through the parasympathetic fibres. These transmit the sensation of a desire to void to the second, third and fourth sacral segments. This sensation leaves the cord as a motor impulse by way of the anterior roots which contain both somatic and parasympathetic fibres. Neither the sensory nor the motor impulses which traverse the parasympathetic fibres are under voluntary cerebral control. They can be inhibited, however, and the internal sphincter prevented from opening by subconscious psychological impulses. Volitional impulses designed to initiate a bladder contraction do not pass down the tracts in the cord in man. This has been confirmed by carefully controlled electrical intra-arachnoid stimulation of the anterior surface of all areas of the cord below the level of any cord injury from C_4 segment to the conus (Munro, unpublished data).

The sensation which activates the second reflex is one of need for immediate micturition. If the urine is concentrated or infected and thus more than usually irritating or if, for some reason, the external sphincter is voluntarily kept contracted or is in spasm, and hence not promptly relaxed by the activated motor response, this sensation acquires a painful element. This is probably caused, in part at least, by the muscular spasm. A sensation of urgency now replaces the earlier one. This disappears only with the successful voluntary relaxation of the sphincter. That this is so can easily be demonstrated by procainization of the nerve supply to the external sphincter (the two internal pudendal nerves). This affords immediate relief of pain and causes emptying of the bladder (Munro and Spatz, 1959).

This second reflex is somatic and under voluntary control. The sensory and motor impulses pass over the internal pudendal nerves, the sacral plexuses and the anterior and posterior roots of the second, third and fourth sacral segments of the spinal cord, the latter being activated by impulses passing down the cord from the cerebral cortex in the long motor tracts.

THE OVERSTRETCHED BLADDER

If a neurologically normal bladder wall is overstretched because of the bladder being unable to empty when an ultimate emptying contraction is present, the detrusor muscle goes into tetany unless the bladder is then emptied. It continues in such tetanic contractions until exhaustion sets in. After such exhaustion the detrusor fibres lengthen to a point from which they are subsequently unable to recover. As a result they are incapable of contracting the bladder wall completely and thus eliminating its cavity. In

spite of this lengthening, the stretch reflex still works and such bladders will store and expel urine. Expulsion, however, is incomplete, resulting in the presence of relatively large and constant amounts of residual urine. Such a condition may be accompanied by damage to the uretero-vesical valvular action and is often followed by a ureteral reflux.

Interference with the outflow of urine and retention because of an unrelaxable or spastic external sphincter, are often ascribed to a mechanical blockade of the proximal end of the urethra, as discussed on page 466. Such a mistake can be prevented by verifying the diagnosis and providing appropriate treatment with the help of a sphincterogram and by repeated procainization of the internal pudendal nerves (Munro and Spatz, 1959). Whether or not this gives permanent relief it at least gives the operator a chance to diagnose the underlying cause of the spasm before carrying out a destructive surgical procedure. In elderly men such retention is often a cause of partial invalidism and is easily corrected by such injections. In these patients the associated large prostate is a coincidental, and not necessarily a causative, finding in relation to the spasm and obstruction.

INCREASED INTRA-ABDOMINAL PRESSURE

There is widespread opinion that micturition can be facilitated by artificially increasing the patient's intra-abdominal pressure. What is not recognized, however, is that such an increase results in prompt reflex contraction of the external urethral sphincter and cessation of urinary outflow. This can easily be demonstrated by coughing during the act of micturition. If voiding has already been established such interruption is only momentary. If, however, voiding has been delayed or prevented by an irritable bladder or spastic sphincter, and the abdominal pressure has been increased, the blockade is perpetuated. The spasm continues until such time as voluntary relaxation can be attained. If it is severe, any voluntary relaxation may be merely temporary, and only a small amount of urine escapes as a dribble, after which the spasm sets in again. Such 'skimming of the top' of the bladder contents may be sufficient to relieve the spasm temporarily and, after a wait of a few minutes, to permit resumption of voluntary relaxation, when the frustrated emptying mechanism again takes control.

It is undoubtedly true that intra-abdominal and intravesical pressures can be raised, particularly by adding manual compression to the strong contractions of the abdominal muscles, to a point when the contracted sphincter can be forced. This type of emptying will leave a variable amount of residual urine. It is also true that, in the absence of any sphincteric spasm, such pressure applied to a neurologically normal bladder, if added to 'a favourable psychological milieu', will expedite the change of any potential but not actual emptying contraction into a complete one, even though the bladder contents at the time may be small and nowhere near the 'critical level of fill'. It is this latter mechanism that permits the individual to urinate at will, and before experiencing the sensation of a need for urination.

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THE NORMAL BLADDER IN INFANCY

Although a small replica of the adult's, the infant's or young child's bladder has certain peculiar and special attributes. The nerve supply, the stretch reflex, the method of fill and the emptying sphincteric reflexes are all as already described. The apparent differences in function are traceable to the small capacity and the lack of recognition by the child of the need for the further storage of urine after an emptying contraction has responded to the presence of a 'critical fill'. As the child grows and his bladder enlarges, this fill increases in amount and is accompanied by an ever-increasing number of aborted emptying contractions as part of the stretch reflex. During this same period, the child learns by experience, association and instruction to control the emptying of his bladder until the circumstances for doing so are propitious. Efforts at formal, regimented training delay rather than expedite this development of his innate physiological response. Indeed they may set up an emotional block which will cause future interference with micturition for a prolonged period after the child would otherwise have developed control of his own accord. Such practical considerations as the greater activity that accompanies increased capacity, and the discomfort caused by being wet, are usually fairly effective by the age of about 3 years. With this knowledge comes gradual ability to relax or contract voluntarily the external sphincter, and the final attainment of complete control of micturition.

RECOGNITION OF NORMAL ACTIVITY OF THE EXTERNAL SPHINCTER

This is possible because the external urethral sphincter and the external anal sphincter are both supplied by the same peripheral mixed nerves—the two internal pudendal nerves. Except in the very rare intrapelvic and lumbar or sacral plexus injuries, it is virtually impossible to denervate one without denervating the other. Thus the demonstration of a reflex contraction of the anal sphincter, which has been pricked with the point of a pin, will guarantee that the external urethral sphincteric reflex is also active. By the same token, if the response of the former is absent, the same response is implied in the latter and both sphincters will be flaccid.

Cystometry and sphincterometry.—The techniques have been fully described elsewhere (Munro, 1952a) and need not be repeated here.

The purposes of a *cystometrogram* are to demonstrate the presence and shape of potential and emptying contractions, the amount of fill in the bladder at the time each occurs, the amount of urine left after each emptying contraction and the presence or absence of the anal reflex. For these observations to be valid, the rate of fill must not exceed 60 drops a minute.

It is the present custom to ask the patient being examined in this way to report his first sensation of a desire to void. This, as well as the maximum intravesical pressure attained by the patient voluntarily increasing his intra-abdominal pressure while attempting to void, are recorded as a part of the examination. In my experience, neither of these observations is necessarily significant or helpful. Although

the patient's observation may, by chance, be accurate, it is actually no more than an interpretation of his attention, interest, fear, or psychological inhibitions and, even under normal conditions, will vary greatly in accordance with these factors. I have never had occasion to use these data and have never felt the lack of them. I am aware that this is not the opinion of other competent observers, who use them as tests of the sensitivity and contractile power of the bladder. In this connexion attention should be called to the fact that the first sensation of a desire to void lies in the somatic sensory field. It is recognizable only after the urine has begun to leave the bladder and has reached the urethra just proximal to the external sphincter.

The *sphincterogram* measures the amount of resistance offered by the external urethral sphincter to the pressure of a column of fluid which is forced against the former's distal surface. The normal amount of pressure that can be exerted in this way without causing the sphincter to give, is known within approximate limits. Any increase or decrease can easily be recognized. The deductions which can be made from such changes are that: (1) if the resistance is increased the sphincter is in spasm, and (2) if it is decreased or absent, the sphincter will be loose or flaccid. Such data, coupled with the type and response of the anal reflex, can be verified by either artificially increasing the intra-abdominal pressure while performing the test, or by the anæsthetization of the two internal pudendal nerves in Alcock's canals.

THE NEUROGENIC BLADDER

The term 'neurogenic bladder' is such an all-inclusive one as to be virtually meaningless, but because of its general acceptance by the profession it is necessary to retain it. It indicates interference with the nerve supply of the bladder and its sphincters. The changes caused thereby are most easily understood if considered in relation to injuries of the segmental and peripheral nervous systems.

SPINAL SHOCK

Every significant spinal-cord injury is accompanied for a variable length of time by spinal shock. After it has disappeared it will return following any surgical procedure, in the presence of surgical shock or of any significant sepsis, if anæmia and hypoproteinæmia are allowed to persist or if a paralytic ileus is permitted to develop. Its effect is to disorganize all splanchnic and somatic reflex activity. The amount and spread of this disorganization are unpredictable; the bladder reflex activities are always affected.

Such loss of the parasympathetic group of reflexes causes the bladder wall to become atonic and the stretch reflex to be lost. Neither aborted nor emptying contractions develop. The internal sphincter remains contracted and shut. In addition, the somatic reflexes, as represented by the external urethral and anal responses, and by the failure of the former to relax, are also lost. The sensations associated with micturition can no longer be appreciated. The result is an atonic, overfilled, increasingly stretched, retentive bladder which may dribble and which is associated with potential or actual ureteral reflux. It should be promptly placed on tidal drainage with the loop set at 2 centimetres (Munro, 1952a).

Such a distended bladder should never be emptied at a single drainage

procedure or through a large catheter. If either of these is permitted circulatory changes may be produced that presumably will drain the cerebral vascular tree and certainly cause a sudden, unexpected death.

TRANSECTIONS OF THE SPINAL CORD

A transection of the spinal cord at the cervical, thoracic or upper lumbar segmental levels is always accompanied by spinal shock as already described. After the latter has disappeared, however, the bladder—provided that it has not been allowed to overstretch and has been properly managed—will gradually pass through the autonomous and hyperactive stages on its way towards recovery, after which it will again empty in response to a critical fill. With this amount of recovered function goes the usual reflex relaxation of the two sphincters and an absence of residual urine *provided that the patient does not develop mass reflex spasm.* There will, however, be an accompanying loss of the desire to void and of the ability voluntarily to contract and relax the external sphincter. The anal reflex will be normal. This is the only type of bladder, other than an infant's or child's or that of a patient totally unconscious as the result of a cranio-cerebral injury, that can be properly called an 'automatic bladder'.

INJURIES OF THE LUMBO-SACRAL CORD

Transections or widely destructive injuries of the lower lumbar and sacral segments (the lumbo-sacral cord) destroy the central connexions of both the parasympathetic and somatic innervations to and from the bladder and its sphincters. As a result, the bladder wall becomes atonic and the sphincters remain contracted. Retention, distension and over-filling are prompt, and a ureteral reflux soon develops. Emptying is possible only by means of intermittent forcible expulsion of urine through, and in spite of, the resistance offered by the closed sphincters. Permanent elongation of the detrusor muscle fibres occurs, as described on page 458.

At some later time—which is unpredictable and usually before such stretching has become extreme—the intramural plexus of nerves comes into play in an attempt to substitute for the lost parasympathetic nerve supply. The former, even though inefficient, can certainly, by its automaticity, produce inefficient and incoherent emptying contractions. The lost innervation of the external sphincter, however, is not replaced and it remains contracted. It no longer relaxes in response to the presence of urine in the proximal urethra. Discharge of bladder urine is therefore possible only when the intravesical pressure has been built up to a point greater than the resistance offered by the closed sphincter. This situation manifests itself by the frequent voiding of small amounts. Depending upon the balance reached between these two opposing forces, emptying may be either sufficient to forestall further stretch of the bladder wall or, if not, will only delay the further continuation of retention, stretching of the detrusor muscle, and a ureteral reflux. It is in this type of bladder that such forcible drainage can be aided by manual compression of the abdominal wall.

A cystometrogram of such a bladder shows a typical autonomous type of curve, the anal reflex will be absent and there will be significant amounts of residual urine. All types of bladder and urethral sensations are lost. A sphincterogram will demonstrate extreme spasticity of the external sphincter.

INCOMPLETE CORD INJURIES

Such injuries, if above the lumbo-sacral cord, will show a functional return in the bladder that will lie somewhere between the automatic response which accompanies transections, and normal responses. This statement is predicated on the cessation of spinal shock and the absence of overstretching and infection of the bladder. The end-result will eventually be determined by the amount of permanent cord damage and the efficiency of the treatment afforded the bladder. With these requirements met, the prognosis for return of bladder function to normal is usually good.

Incomplete injuries of the lumbo-sacral cord are almost unknown so far as their effect on the bladder is concerned. The critical area of symptom-producing damage in this part of the cord is so small and the force applied so relatively great that injuries to this area are practically always complete in relation to the bladder. The prognosis for recovery again depends upon the factors already mentioned, but at best it is very poor and leads to a life of urinary disability and invalidism. Tidal drainage, however, if properly used for as long as the bladder function is abnormal, greatly improves this gloomy outlook (Munro, 1952b) and will usually change total disability into socially acceptable self-care and even remunerative employability.

INJURIES OF THE ROOTS, CAUDA EQUINA AND PERIPHERAL MIXED NERVES

Injuries of the parts of these nervous structures that innervate the bladder, the sphincters, and the perineal muscles will alter bladder function in accordance with the location and number of the nerves which have been injured. Division of the second, third and, to a lesser degree, of the fourth sacral roots or of the corresponding elements of the cauda will cause splanchnic and somatic sensory and motor paralyses in accordance with their various peripheral distributions. Total removal of the parasympathetic plexuses in extensive pelvic surgery will produce an atonic, obstructed bladder which will shortly turn into an autonomous obstructed bladder. The prognosis and treatment are the same as those of the atonic and autonomous bladders produced by lumbo-sacral segmental cord injuries.

Division of the somatic sacral root, cauda equina and sacral plexus elements which make up the peripheral mixed internal pudendal nerves, will produce an atonic or flacccid external sphincter with total loss of somatic sensibility and voluntary motor control. Such loss entails total urinary incontinence, for which there is no known effective treatment. In particular, it is to be noted that this incontinence is not altered by catheter drainage. The bladder continues to empty itself with each emptying contraction even,

if necessary, around the catheter, and, because of a gradual lessening of its contents and the consequent loss of normal stretching, shrinks. This only makes matters worse because of the eventual reduction of its storage capacity to zero. In all such cases the cystometrogram is normal (until the bladder shrinks), the sphincterogram shows a pressure of zero, the anal reflex is absent and the anal sphincter flaccid. There is no residual urine.

THE MASS REFLEX AND OTHER PERIPHERAL SPASM

Mass reflex spasm is one in which a spreading maximal flexion or extension spasm starts in the feet and extends upward into the leg, abdominal and paraspinal muscles in response to a minimal noxious stimulus to the skin of the periphery of the body. Included in this spread are the detrusor muscle and the external urethral sphincter. The height to which this spasm will spread is limited by the upper level of the cord injury. It is commonly associated with both transecting and partial cord injuries. It does not occur in pure root or cauda equina injuries. As a result, in patients with damage above the lumbo-sacral segments, micturition is obstructed, the bladder distended and overstretched, and retention and ureteral reflux develop. The bladder also becomes irritable because of the detrusor muscle spasm. To be sure, an indwelling catheter will keep the sphincter open and thus prevent the overstretching and distension. If it is constant, however, the bladder will shrink and lose its storage capacity. The likelihood of this latter complication is enhanced by the detrusor spasm and can be diminished by the use of tidal drainage supplemented by repeated injections of procaine into the sacral roots through the spinal sacral foramina. Intermittent, manually controlled drainage and irrigation will be less effective

The problem of the spastic sphincter, however, cannot be solved until and unless the mass reflex spasm has been brought under control. Cord transections will require an anterior root rhizotomy (Munro, 1945) in order to be certain of attaining such control without damage to the sacral roots. A less accurate method, and one with not infrequent failure or sacral root damage, is the intra-arachnoid injection of alcohol or phenol.

The entire problem is much more complicated in partial cord injuries because of the need for retaining whatever voluntary motion has remained intact after the injury. It is for this reason that such a destructive procedure as rhizotomy is contraindicated. The best method of dealing with this situation, particularly as it affects urination, has not been determined as yet. Differential rootlet section offers promise (Munro, 1952b), as does the repeated injection of procaine into the sciatic nerves of the upper thighs, of the sacral roots through the sacral spinal foramina and of the internal pudendal nerves in Alcock's canals (Munro, 1959). This problem is in urgent need of solution.

THE VESICO-SYMPATHETIC SYNDROME

This syndrome is associated with distension of the bladder and occurs in patients with both transecting and partial cord injuries. The injury may be

located in the cervical, the thoracic or upper lumbar segments. The pathology of the syndrome is not known. Its occurrence is unpredictable and may also arise in association with chronic distension of the large bowel. The symptoms have a regular progression. The patient first develops a headache. This is followed by a rise in systolic blood pressure. If the bladder is not emptied at this time, stupor ensues, followed by unconsciousness, generalized convulsions and death. The progress is slow, the syndrome tends to recur and, when present, causes a tremendous sense of apprehension in the patient. Sweating, pallor and, in the later stages, collapse are associated with it. The only effective therapy is to empty the bladder and keep it empty. The condition is very resistant to treatment and appears to be associated with some unknown and abnormal activity of the sympathetic nervous system. It seems to be self-limiting after many months. Local anæsthetization of the sacral roots, correction of any cystitis and prevention of the collection of residual urine in the bladder help to relieve symptoms. No drug can be counted on to give more than temporary relief. It is probably, but not necessarily, associated with mass reflex spasm. The diagnosis is made from the symptomatology already described. Cystometric and sphincterometric studies have been inconclusive because of insufficient observations.

CHRONIC NEUROGENIC DISTENSION AND RETENTION

The common factors are atony of the bladder wall and spasm of the external urethral sphincter or both. The diagnosis of the first is made by cystometric studies and of the second by sphincterogram, as well as by testing the anal reflex. The symptomatic therapy of the first is primarily prevention, preferably by tidal drainage. The second is dealt with by anæsthetizing the two internal pudendal nerves. Neither method will be effective until or unless the underlying cause has been properly treated as, for example, in spinal shock and in the presence of the mass reflex. If untreated mechanically, imperfect emptying and a ureteral reflux, both serious complications, will develop. The commonest diagnostic mistake, made in the absence of a sphincterogram, is to incriminate allegedly hypertrophied tissue at the urethro-vesical junction as the cause, and to substitute a transurethral resection (T.U.R.) for treatment of the spastic sphincter.

CHRONIC NEUROGENIC SHRINKAGE OF THE BLADDER

This is associated with a flaccid external sphincter complicating an otherwise normal emptying mechanism that is functioning in the presence of an irritable or hyperactive detrusor muscle. The sphincteric part of this problem has already been considered in the section dealing with destructive injuries of the somatic peripheral mixed nerves (p. 463). The other develops as a part of the mass reflex syndrome and whenever there is an active, chronic cystitis complicating any of the conditions described. This latter diagnosis is by examination of the urine and a cystometrogram.

Treatment of the hyperactive detrusor muscle, if necessary, is best car-

ried out after relief of the infection. The most effective means is by repeated local anæsthetization of the sacral roots in their respective sacral spinal foramina. Any treatment, no matter what it may be, of this combined lesion needs to be prolonged, is associated with many recurrences of the symptoms, and offers only a fair prognosis. Prevention is much more effective.

THE NEUROGENIC BLADDER IN DISEASE OF THE CORD

Any variety of abnormality of the nerve supply of the bladder may occur in any combination of sensory loss or motor paralysis in a wide range of diseases of the spinal cord. Isolated or combined involvement of the sensory and voluntary motor tracts, the sacral cord or its roots will alter the responses of the stretch reflex of the detrusor muscle and those of the external sphincter. If complicated by peripheral muscular spasm, as, for example, in multiple sclerosis, both may go into spasm in addition. The symptomatology will be analogous to that of the conditions described under cord injuries except that it will assume a more complicated form. When the sensory component is predominant, as in tabes dorsalis, the loss of the afferent impulses will preclude efferent motor responses. As a result, the bladder will be distended and the sphincters fail to relax, and the anal sphincter reflex response will be absent.

Tumours compressing the cord or involving its substance will cause changes in bladder function as well as symptoms traceable to interference with its nerve supply in accordance with the latter's degree and location. This is also true of intramyelogenous hæmorrhages, the symptoms being traceable to the amount of the myelogenous destruction and tissue death that may be present.

CONCLUSION

An understanding of the changes associated with the symptoms manifested by a neurogenic bladder can best be reached when the physician is familiar with the normal physiology of the bladder in man. Only in this way can he interpret the resultant alterations in the activities of that organ.

Ample simple methods are available for use in demonstrating both normal and pathological urinary bladder function. Their use is indispensable if a neurogenic bladder is to be treated effectively. With their proper employment, chronic and possibly lethal complications can be prevented from developing after the patient would otherwise have recovered from the underlying disease or injury.

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CONGENITAL ANOMALIES OF THE GENITO-URINARY TRACT

By D. INNES WILLIAMS, M.D., M.Chir., F.R.C.S.

Genito-Urinary Surgeon, The Hospital for Sick Children, Great Ormond Street; Surgeon, St. Peter's and St. Paul's Hospitals

With our growing ability to control and cure acquired disease the treatment of congenital abnormalities has become an increasingly important part of urological surgery. Some anomalies are evident at birth, so that there is little doubt as to their nature, whilst others do not cause symptoms until later childhood or even early adult life. The latter group includes a large number of abnormalities presenting in many forms, not easily distinguishable from acquired disease and, indeed, usually complicated by infection and secondary changes in the kidney. The recognition of the basic congenital defect in certain apparently minor illnesses is of vital importance if the serious consequences of these complications are to be avoided, and this article is therefore concerned with the mode of presentation of the various types of anomaly. Anatomical classifications of urogenital anomalies are normally favoured by most textbooks, but for the present purpose a functional viewpoint is more appropriate. It may be suitably prefaced by a reminder that some anomalies—many examples of fused kidney and double ureter, for instance—are harmless, and when they are discovered on routine examination there is some danger that symptoms such as abdominal pain may be erroneously attributed to them.

ANOMALIES CAUSING RENAL FAILURE

Renal failure may result from a primary renal defect or from obstructive and infective complications of defects in the urinary passages. The most serious of all are those in which there is from birth an insufficient amount of functioning renal tissue, and which therefore result in irreversible renal failure: sometimes in early infancy; sometimes delayed until adolescence or even early adult life. It must be realized that urine is formed by the fœtal kidneys from quite an early stage in development but, as the clearance of waste products of metabolism takes place through the placental circulation, growth of the rest of the body may be normal in spite of anomalies involving gross diminution in the amount of renal tissue. A baby may therefore appear normal at birth, although the kidneys, due to hypoplasia or cystic disease, are inadequate to maintain independent existence for more than a few days. In the exceptional and extreme case of bilateral renal agenesis the baby is usually stillborn or dies within a few hours of birth, but this is as much due to the concomitant abnormalities in the lungs and other parts of the body as to renal failure.

Hypoplastic kidneys and atrophic pyelonephritic kidneys complicating ureteric anomalies are occasionally responsible for uræmia in early life, but more commonly the onset of symptoms is delayed until many years have passed. With them there is often little urinary disturbance to draw attention to the nature of the disorder and the child is brought up simply because of dwarfing or even the bone changes of osteodystrophy, particularly genu valgum (fig. 1). Vomiting, thirst and polyuria are symptoms which more readily suggest a renal cause and the connexion of hypertension with renal disease is not likely to be missed.

FIG. 1.—Bilateral mega-ureter causing renal failure and osteodystrophy. Child of 6 years with genu valgum.

Polycystic disease may also be responsible for renal failure at a very early stage or much later in life. The infantile form is comparatively rare but diagnosed too often; when bilateral renal enlargement is found in the newborn it is vital to eliminate the possibility of urinary obstruction before making this diagnosis. At this age it occurs in siblings but seldom in different generations of the same family, and it is usually fatal within a few months of life. The adult form of the disease is discussed in another article in this symposium (p. 445) and therefore will not be further described.

Most often renal failure in infancy is due to a congenital obstruction in the lower urinary tract, with pre-natal destruction of the kidneys by back-pressure, for although urinary excretion is not essential to fœtal life, urinary obstruction at this period will cause all the most severe changes seen in post-natal and acquired disease. Often the first sign of trouble in infants is simply a failure to gain weight, with vomiting and difficulty in feeding. Examination at this stage may well reveal a chronically distended bladder with dribbling overflow of urine and perhaps also palpable kidneys. Too often the napkins conceal the disorder of micturition and the other signs are regarded as due to gastro-intestinal disorder. After a few weeks rapid deterioration occurs, with acidosis, dehydration and abdominal distension, and at this stage little can be done. The outlook in the severely uræmic infant is always poor: there is considerable immediate mortality and even if by surgery the obstruction is eliminated there may be insufficient renal tissue to carry the child through normal life. In the less serious cases, recovery is possible if diagnosis is prompt, and infection, often introduced by ill-advised catheterization, is avoided. The exact diagnosis of the site of obstruction is better left until all preparations for surgery are complete.

ANOMALIES CAUSING RECURRENT URINARY INFECTION

Throughout childhood and adolescence urinary infection is a common indication of the presence of anomalous developments in the urinary tract. It is well known that any form of stasis predisposes to infection and the obstructive anomalies are often responsible. Thus, congenital pelvi-ureteric obstruction causing simple hydronephrosis may be found on investigation, although this anomaly more usually causes renal pain with sterile urine. Mega-ureter in its various forms is another common finding, as are bladder-neck and urethral obstructions. Various types of duplication of the ureter, with or without ureterocele in the bladder, cause recurrent infection in the same way as any other imperfectly drained pockets in the urinary tract: vesical or urethral diverticula, for instance. These are all major anomalies which are for the most part well known, but it has only in recent years become clear that congenital vesico-ureteric reflux taking place during micturition predisposes to recurrent infection and pyelonephritis, even in the absence of bladder-neck obstruction or ureteric dilatation.

It is evident therefore that urinary infection cannot be regarded as a mild ailment to be treated simply by chemotherapy. It is true that infection can occur in a normal urinary tract at any age, particularly perhaps in infancy, but any infection which does not rapidly respond to medical treatment and which is accompanied by hæmaturia, palpable kidneys, raised blood urea or an unusual infecting organism such as Proteus, should be investigated immediately. All infections in boys, and any recurrent infections in a girl, merit at least a pyelogram. In general the investigation can be postponed until the attack has subsided, for even if an obstruction is present an antibiotic will usually control the pyrexia, even if it will not eradicate the pyuria. Occasionally a pyonephrosis or an acutely obstructed and infected bladder requires urgent surgical drainage leaving the detailed diagnosis to be determined later.

The success or failure of surgical treatment in these cases depends very largely upon the degree of renal damage which has taken place before the diagnosis is made. The most satisfactory are those in which infection is confined to one half of the kidney with a double ureter, for in these complete excision is possible without seriously reducing the amount of functioning renal tissue. In unilateral cases of advanced disease nephrectomy may be required but infections and pyelonephritis are usually to some extent bilateral and every opportunity should be used to preserve rather than to excise renal tissue. Obstructions can usually be overcome although they may leave such sacculated bladders or such dilated ureters that a full return to normal function is not possible. Reflux can be prevented by operation in most cases and, if pyelonephritis has not gained too great a hold on the kidney, recurrent infections can be controlled in this way.

ANOMALIES PRESENTING WITH URINARY INCONTINENCE

The great majority of children with incontinence of urine are enuretics in

whom there is no detectable abnormality of the bladder; they are simply suffering from a persistence of an infantile habit of bladder function. Anomalies may be responsible for other forms of incontinence, however, and it is important to diagnose these cases at an early stage rather than to allow them to go on in the hope that growing older will effect an improvement. A more precise analysis of the symptoms will often give the clue to what is required, and careful inquiry into the nature of the incontinence must be made. Simple enuresis may manifest itself in nocturnal incontinence only, which is seldom of serious import, or diurnal frequency and urge incontinence in addition. Cases in this second group should be investigated if they resist a simple training regime, for mild degrees of congenital bladder-neck obstruction may also produce frequency and urge incontinence, as may any anomaly complicated by infection.

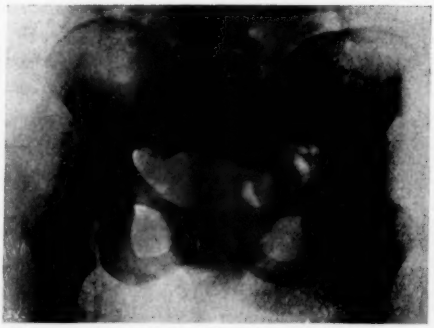

FIG. 2.—Congenital deformity of the sacrum without meningocele, associated with a neuropathic bladder, first giving symptoms in adolescence.

More serious degrees of obstruction manifest themselves by continual dribbling incontinence of urine to the extent that normal micturition ceases to occur; if a child is suffering from this symptom, even if still in infancy, investigations must be undertaken forthwith. Usually the overflowing bladder will be palpable in the abdomen and it must be remembered that this almost always implies ureteric dilatation and renal damage. Nevertheless, the obstructed bladder which presents in later childhood with overflow incontinence is much more likely to have a satisfactory outcome than the obstruction which shows as renal failure in infancy. Urinary control as well as renal function can be restored by removing the obstruction.

A history of continual dribbling incontinence, usually associated with fæcal incontinence, is characteristic of the congenital neuropathic bladder. In many of these the presence of a myelomeningocele leaves no doubt about the diagnosis, but in a few the abnormality of the spinal column produces no external deformity (fig. 2) so that the urinary incontinence may be regarded as 'enuresis'. A careful neurological examination, however, testing particularly the sensation of the perineum, will usually lead to the correct diagnosis. Treatment of the neuropathic bladder cannot be curative; occasionally it is possible to obtain some control of micturition by voluntary effort using the abdominal muscles, but more often appliances must be used, or the urine must be diverted from the bladder to a urinary ileostomy.

Continual dribbling incontinence in a girl despite apparently normal

micturition is typical of an ectopic ureter, an abnormality readily corrected by surgery. One ureter, usually that from the upper pole of a double kidney, opens into the lower urethra or vagina, where it is not controlled by the sphincter. Once recognized it is a simple matter to excise this ureter with its corresponding renal segment, leaving normal bladder function.

The external abnormalities, epispadias and ectopia vesicæ, also cause urinary incontinence though a simple inspection will provide the diagnosis.

EXTERNAL ABNORMALITIES

Abnormalities of the external genitalia are evident at birth and evident not only to the doctor but to the parents as well, who often combine an exaggerated apprehension as to the danger to life with a touching faith in the efficacy of surgery. It is essential therefore that the doctor attending the infant should give the parents a clear idea of the likely course of events at the earliest possible moment, and if surgery is to be required in later years it is well for the parents to talk over the matter with the surgeon who will be concerned, even though nothing immediate is contemplated.

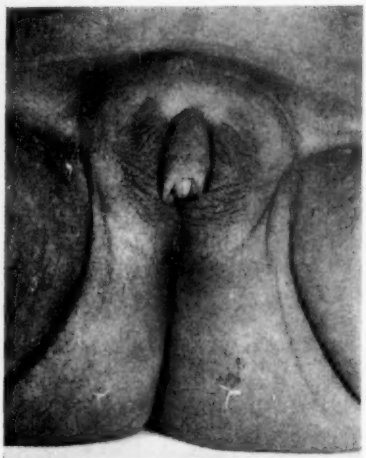

FIG. 3.—The external genitalia in a female pseudohermaphrodite suffering from adrenal cortical hyperplasia.

Hypospadias is the most common anomaly of the external genitalia, but is often of such a minor degree that no treatment is required. The urethral meatus lies at some point on the under surface of the penis, short of the tip, but if it is no farther back than the coronal sulcus and is of adequate calibre no disability results. Occasionally meatal stenosis complicates this, but it is easily corrected by meatotomy. In more sevefe cases there are two disabilities: one urinary and one genital. The stream is difficult to direct during micturition and the penis has a ventral curvature accentuated during erection, so that sexual intercourse becomes impossible. Operative correction consequently involves two stages: one to correct the curvature, which must be completed first, and one to bring the urinary meatus up to the tip of the penis. It is an advantage to the child if micturition is normal before he goes to school, but there is no advantage in starting treatment very early. As children at the toddler stage do not react well to hospitalization, the first operation may be conveniently performed at the age of about four years.

If hypospadias is of severe degree and is combined with a small penis and undescended testicles, the male child is easily mistaken for a female:

this is perhaps the simplest of the intersex anomalies. Genitalia of equivocal sexuality also occur in the female, usually as a result of congenital adrenal hyperplasia (fig. 3), occasionally due to androgenic hormones administered to the mother, and rarely without endocrine cause. The true hermaphrodite, in whom both testicles and ovaries are present, has likewise no easily defined external appearance. The diagnosis of intersex cases is therefore one of great complexity, but it is urgent: the psychological consequences of an error are disastrous to parents and child and in the endocrine cases there is a serious danger to the life of the child from electrolyte disturbance. A diagnosis cannot usually be made clinically and nuclear sexing is only a partial answer. Babies with genitalia which give no firm clue as to the sex should therefore be admitted to hospital immediately for full investigation.

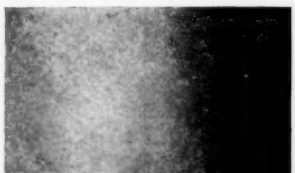

FIG. 4.—Male child with ectopia vesicæ: the penis is partly hidden by the protruding bladder.

Ectopia vesicæ is easy to diagnose but difficult to treat: the bladder lies exposed and extroverted on the lower abdominal wall and the ureters open directly onto the surface (fig. 4). Seen for the first time, its appearance suggests a need for urgent surgery, yet in fact there is no immediate danger to life and treatment is better postponed for a few months at least. In the past, uretero-colic anastomosis with excision of the bladder has been the standard treatment and the only way in which the child could be kept dry. The long-term disadvantages of uretero-sigmoidostomy have been increasingly apparent, however, and it seems inevitable that renal failure will follow this operation, perhaps within a few years, occasionally postponed as long as twenty years. Other types of urinary diversion have therefore become more popular, particularly the urinary ileostomy, and have undoubtedly proved much less deleterious to the kidneys, but all have the disadvantage of producing an abdominal stoma which must be controlled by an appliance.

Interest in the possibility of reconstructing a normal bladder from the maldeveloped organ has also received increased attention during the past few years. The difficulty lies in the formation of a sphincter at the bladder neck, but particularly in girls this has proved possible on a number of occasions. Operative techniques are still somewhat experimental but it seems likely that in the future reconstructive surgery will be successful in a proportion of these unfortunate cases.

SOME COMMON SOFT TISSUE LESIONS OF THE MOUTH

By PATRICK M. PAWSEY, M.B., B.D.S., F.D.S.R.C.S.
Bracknell, Berks.

This article deals with some more of the common lesions of the mouth which fall into the province of the dental surgeon as well as the general practitioner in medicine. The diagnosis of lesions which are treated by extraction of teeth has been considered in a previous review (Pawsey, 1958).

A systematic approach to examination (table I) is essential. Without recourse to such a system the practitioner is liable to refer for specialist

Breath:	Odour
Lips:	Anæmia, cyanosis, herpes, cracking
Tongue:	Protrusion (twelfth nerve), tremor, colour, coat (dry or moist), papillæ, ulceration
Teeth:	Caries, dentures
Gums:	Pyorrhœa, hæmorrhage, sordes, pigmentation
Buccal mucous membrane:	Ulceration, pigmentation
Palate:	Anæmia, jaundice
Pharynx:	Movements of the soft palate (tenth nerve), inflammation, tonsils, palate reflex
Local lymph glands:	Swelling

Table I.—Schema for examination of mouth and pharynx.

attention patients whom he could have dealt with himself. This regime forms the basis of a complete examination of the mouth. It is proposed to discuss only lesions common to the dental and medical practitioner.

THE BREATH

Although halitosis may be caused by dental abnormalities, it is not a common complaint of dental patients.

Pyorrhœa in its early stages rarely causes foul breath. Later, when the only possible treatment is extensive or complete extractions, it may be characterized by halitosis. Even then it is rarely noticed by the patient.

Vincent's gingivitis, on the other hand, almost always gives rise to halitosis, sometimes described as the smell of sweet hay. Once known to the practitioner this smell is pathognomonic and forms one way of differentiating these two commonly confused conditions.

Other dental conditions which cause halitosis are poor oral hygiene, food stagnation and bleeding in the mouth.

THE LIPS

Chronic inflammation in cracks radiating from the corners of the mouth is a condition usually caused by one of three things:—

A close bite.—Through extensive loss of opposing teeth or wearing the same full dentures for a prolonged period without dental attention (some denture wearers need new dentures within two years) the jaws overclose when biting. This causes the corners of the mouth to droop, thus giving the appearance commonly associated with age.

Perlèche.—A low-grade infection due to the habit of licking the lips.

Anæmia.—Idiopathic hypochromic and other iron-deficiency anæmias.

Vitamin deficiency, probably riboflavine, is another cause of angular cheilosis but is most uncommon in this country.

THE TONGUE

Lesions of the tongue caused by dental abnormalities are uncommon, but it should be remembered that *lichen planus*, *erythema migrans*, *leukoplakia* and other inflammatory conditions of the tongue may be aggravated by trauma. The sharp edges of decayed or badly filled teeth, calculus (tartar) and sometimes ill-kept, ill-fitting or badly made dentures should be sought for. If present, the patient should be referred to a dental surgeon.

The black or brown furry tongue which is becoming more common is seen after a course of antibiotics, or in smokers or sometimes without a history of any sort. The etiology is unknown and treatment difficult, but the patient may be reassured that serious sequelæ are almost unknown. The tongue may be painted with gentian violet and the patient given vitamin B therapy and lozenges of phenol B.P. 1948 to suck. Another suitable line of treatment is application of glycerin of borax B.P.C. followed by gentle brushing with a toothbrush twice a day. Nicotinic acid B.P. and the quaternary ammonium salts have also been used.

DENTAL CARIES

If a doctor refers a patient with very carious teeth to a dental surgeon, it is almost always on the supposition that there is some infection arising from the caries. Dental decay itself is not a disease which causes general symptoms. The only time a deep-seated infection occurs is when the pulp of a tooth has become exposed to the mouth. (The main purpose of a dental surgeon's work is to stop this occurring by early treatment of decaying teeth.) Initially there is always pain in such a case, although the patient may not consult either doctor or dentist at this time. It is probable that superimposed or secondary infection is the cause of the large majority of *alveolar abscesses* (apical abscesses, dental abscesses or gumboils as they may be called) seen by the clinician. Such a patient comes with the well-known picture of a swelling, usually in the buccal sulcus, associated with a broken-down tooth and often some enlargement of the appropriate lymph glands. It cannot be over-emphasized that any patient with a gumboil must be referred to a dental surgeon. The use of external heat only increases the

severity of the condition. There are only two ways to prevent a recurrence: one is to extract the tooth and the other is to remove the pulp and institute drainage through the tooth. A recurrent gumboil under a milk tooth can damage the adult successor, and this is the most important indication for extracting milk teeth.

Dental treatment in the acute phase can only be done under general anæsthesia and, although this may be difficult to arrange at short notice, it is highly desirable from the patient's point of view. A poor second line

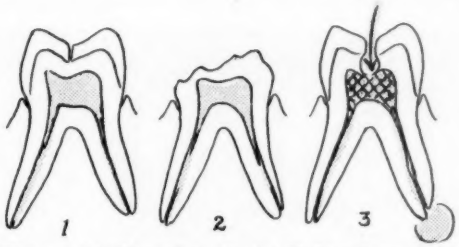

FIG. 1.—(1) Normal tooth. (2) Broken-down tooth without exposure of pulp. (3) Small cavity with exposure of the pulp and gumboil. This tooth must be extracted.

of treatment involves administration of penicillin or some other antibiotic working in the presence of pus, and reference later for dental treatment under local anæsthesia. By careful examination any dental surgeon can tell if a pulp is exposed, and, as already explained, this exposure is an essential prelude to deep-seated infection. The patient may have forgotten the initial pain of the gumboil and present with symptom-free chronic inflammation at the apex of a tooth which is only demonstrable by radiographic examination. This chronic form of focal sepsis is thus more difficult to diagnose and, because it may persist after extraction of the offending tooth, can never be excluded without a complete radiographic examination of the mouth.

The other reason a doctor may refer a patient with gross caries is on the supposition that inadequate mastication is the cause of chronic indigestion. Recent work has demonstrated that this is highly improbable and it is well known that edentulous patients can masticate in a fairly satisfactory manner.

FOCAL SEPSIS

From the rapidly decreasing field of conditions which have been associated with focal sepsis in the mouth one or two still remain.

Open infection of the mouth, usually from parodontal disease, can lead to *acute ascending parotitis* (especially in debilitated patients), *superficial glossitis*, an *infected throat*, *uveitis* and *gastritis*. It has also been shown that oral infection can drain into the lungs when the patient is in bed asleep. Closed infection or true focal sepsis, usually at the apex of a tooth root (fig. 1), is commonly thought to be a source of infection in cases of *sub-*

acute bacterial endocarditis although this has not been proved in spite of many extensive series. Other conditions which may be caused by closed sepsis in the mouth include: '*pyrexia of unknown origin*', *anæmia* and possibly some '*rheumatic*' *conditions*. Sepsis in the mouth may, of course, lower a patient's resistance to disease and thus aggravate any general condition which may be present.

DENTURES

There are two *hyperplasias* which arise from wearing dentures. The first, and less common, is a red, inflamed papillary overgrowth of the gingiva

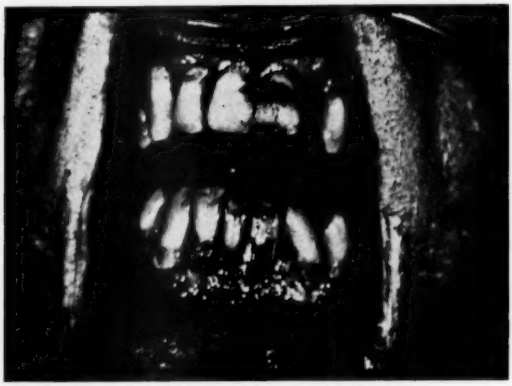

FIG. 2.—Pyorrhœa (parodontal disease). Note the retraction of the gums and the gross calculus formation. There were no symptoms present in this case.

underlying a denture which has been worn day and night. The only known way to clear it up is to expose the affected part of the mouth. This can be done either by constructing a new skeleton type of denture, which avoids the areas affected, or by leaving the dentures out completely for a period of several months. In either case it may be necessary to resect the larger papillary growths.

The second hyperplastic condition arising from wearing dentures is often called a fibrous epulis, tissue overgrowth or tissue hypertrophy. It also arises from chronic trauma, usually in a patient who has worn full upper and lower dentures day and night for a period of more than five years. This is usually a linear-based hyperplasia of the buccal mucous membrane and often arises in many folds which come to overlap the sides of the loose denture. It can cause the patient a good deal of distress; sometimes cancer-phobia. More often it is not noticed until he presents for construction of new dentures. A sessile tissue hyperplasia can resemble a fibroma since it is also covered with normal mucous membrane and has a thick base. If the patient requires new well-fitting dentures, it is essential to remove all the excess tissue surgically. The lesson to be learned from these conditions is that no patient should be recommended to wear their dentures at night.

Another cause of concern to denture wearers is *ulceration of the gums*. This often occurs during the first weeks of wearing a denture and can be relieved by removing and repolishing the offending part of the denture. Chronic ulceration occurring when the dentures are old may indicate an acquired incorrect biting habit, a retained tooth root, an unerupted tooth, or, rarely, an underlying neoplasm. If the denture has been worn for many years it may require relining or renewal.

Allergic reactions to acrylic dentures have become less common since it was realized that free monomer due to inadequate curing was the cause. There are, however, cases on record of allergic reactions to various denture cleansing agents and this matter should be investigated before assuming that the denture base has caused such a condition.

PYORRHŒA

The most common pathological condition of the gums is, of course, pyorrhœa (fig. 2). A dirty mouth is not necessarily associated with pyorrhœa nor does pyorrhœa cause spontaneous bleeding. The terms, pyorrhœa or parodontal disease, refer to the pockets which form down the sides of the teeth between the gum and the roots. A normal degree of pocketing is always present, usually taken to be 2 mm. One does not say that pyorrhœa is present unless this amount is exceeded. The simplest form of pyorrhœa causes the formation of a regular pocketing of, say, 3 mm. around each tooth present in the mouth and this may well be symptom free. The more complex form occurs when this pocketing becomes irregular by the formation of parodontal abscesses around traumatized teeth. This condition is always associated with calculus (tartar), not necessarily the chalky white kind which most people have, but usually the more ominous form of discoloured (usually black) calculus which forms in the pockets. It is of the same composition as the white calculus, but has added blood from the local trauma which it causes to the gingiva. If the irregular type of pocketing is evident, it is usually necessary to extract the teeth around which the deeper pockets have formed. As a rule of thumb, it is necessary to extract teeth which are mobile; mobility is tested for by placing a finger on each side of the tooth and rocking it gently from side to side. If there is no mobility it is usually possible to save the tooth and render the mouth free from infection by simple scaling and other measures, such as local removal of excess gingiva, instruction of the patient in a correct method of toothbrushing, and the use of wood points to clear the stagnant areas which the toothbrush does not reach.

There is no known form of drug therapy which has any permanent effect in the treatment of pyorrhœa.

BLEEDING OF THE GUMS

Bleeding of the gums is an unusual symptom, one which must be taken seriously and one which can usually be stopped by purely local measures. Vitamin therapy is rarely any help in this matter.

Spontaneous bleeding from the gums which arises without any trauma is practically diagnostic of *Vincent's gingivitis* (fig. 3). This is a well-recognized condition best diagnosed on the history which almost always includes pain in the gums, fœtor oris and the associated foul taste in the mouth, a specific form of ulceration usually starting on the tips of the interdental papillæ, lymphatic enlargement of the appropriate region, often noticed by the patient, and general symptoms. This condition may occur in an otherwise healthy mouth and can be picked up in canteens and comparable community feeding centres, but it is more often associated with

FIG. 3.—Vincent's gingivitis (trench mouth). Note the ulcerating gums around the teeth. Pain is characteristic.

a marked degree of irregularity of the teeth, or calculus or other conditions which tend to form stagnation areas in the mouth. Each time a patient has an attack he becomes more liable to further attacks by virtue of the new stagnation areas which are formed by the destruction of the interdental papillæ. The initial, acute attack can always be controlled by appropriate antibiotic therapy; suitable lines of treatment are penicillin lozenges dissolved continuously in the mouth for not more than three days, tyrothricin, or the quaternary ammonium salts or local treatment, which involves painting the affected areas with 20 per cent. chromic acid, leaving the acid in place for one minute and then reducing it with excess of hydrogen peroxide. This, of course, is the province of the dental surgeon. Once the acute condition is controlled it is essential to remove the calculus, to do any fillings which are necessary, to instruct the patient in a proper method of oral hygiene, to destroy the toothbrush which the patient has been using before treatment and not to forget that this infection can be picked up by contact with other infected mouths.

Frank hæmorrhage from the gums from other conditions is uncommon, but diseases such as scurvy, the leukæmias, Hodgkin's disease, aplastic anæmia, hæmophilia, the heavy metal poisons should be considered. All

these conditions, however, represent less than 5 per cent. of the patients and are all associated with other much more obvious symptoms.

Bleeding which occurs only during toothbrushing is more difficult to treat. Apart from a new toothbrush it is almost always caused by one of two things: either the calculus which forms between the gums and the teeth (one can appreciate how toothbrushing rubs the gum up against this calculus and thus causes bleeding which, itself, causes the discoloration of the calculus), or stagnation areas reached by the toothbrush only rarely, but when the brush does reach them it causes bleeding much more readily. The bleeding in this type of condition can be stopped by use of a correct toothbrushing method and cleaning between the teeth (or the other stagnation areas) with the soft wood points already mentioned. This removes the food debris which causes the inflammation and massages the gums bringing them back to a healthy condition. Bleeding from the gums on toothbrushing is not an indication for using a harder or softer toothbrush, or for stopping cleaning the teeth. All these suggestions only make the condition worse. It is rarely necessary to use anything but a medium bristle or nylon brush, preferably of the straight cut variety. It is a great mistake to recommend a patient to use a softer toothbrush when normal brushing causes bleeding; these patients should be referred to a dental surgeon for his advice. The only exception to this rule is during pregnancy when there is an increased susceptibility to bleeding and conservative measures should be undertaken until the baby is born.

HYPERPLASIA OF THE GUMS

Generalized hyperplasia of the gums is a rare but interesting symptom and is most often found in connexion with phenytoin therapy. It is a condition which demonstrates the necessity for closer cooperation between the doctor and the dentist. Although the lesion is purely medical in origin it is often seen first in the dental surgery. There is nothing the dental surgeon can do to stop the progression of the lesion although a high standard of oral hygiene must be maintained. It does not occur in the edentulous mouth and does not always resolve on withdrawing the drug. On the other hand, in order to maintain adequate oral hygiene, it may be helpful for the dental surgeon to remove this hyperplastic tissue during, or after, cessation of the phenytoin therapy.

Localized hyperplasia of the gums occurs, apart from the denture conditions mentioned, as a fibrous epulis which develops from gum proximal to a tooth with caries, calculus or other sharp edges. This is a swelling composed of reparative tissue with a variable degree of inflammatory infiltration. Apart from surgical removal of the tumour it is necessary to eradicate the cause. A much more prolific form is the myeloid epulis, myeloid sarcoma, peripheral osteoclastoma, or more correctly called the peripheral giant-celled reparative granuloma. This occurs under similar conditions in a younger age-group and requires more extensive resection.

THE BUCCAL MUCOUS MEMBRANE

Ulceration of the buccal mucous membrane occurs in several forms. The most common are '*dyspeptic ulcers*'. These do not respond to any systemic therapy, and local measures such as the application of glycerin of borax B.P.C. by the patient must be resorted to. Recurrent ulceration, in which pain is the usual presenting feature and the mucous membrane heals without scars, has been treated with some success in the past by periodic exposure to oxytetracycline lozenges for periods of five days, repeated, if necessary, when the symptom becomes severe again. This period varies from six months to several years. Another line of treatment is the use of hydrocortisone pellets. Various other forms of treatment have been tried, including antihistamines and hormone therapy, with some success in individual cases. Recurrent ulceration which leaves a scar is resistant to all known forms of treatment, but any cause of trauma in the mouth such as already mentioned, should, of course, be treated by a dental surgeon.

The most common *benign tumour* of the cheek is a fibro-lipoma or soft fibroma which occurs opposite the biting surface of the teeth. It may interfere with mastication and become ulcerated from trauma. The tumour is sessile or pedunculated and may be removed easily under local infiltration anæsthesia, together with a small area of the surrounding cheek. Non-absorbable sutures are the most satisfactory.

LOCAL LYMPH GLANDS

Submandibular lymphadenopathy from dental causes is most commonly due to a tooth with an apical abscess, which has already been considered, or pericoronitis (soft tissue inflammation) around the crown of an erupting lower wisdom tooth. This latter condition often presents first at the doctor's surgery and can be mistaken for infection spreading from the throat or the associated lymphatic and cellular swelling for mumps. Careful examination will demonstrate a partially erupted, often impacted, lower wisdom tooth, commonly some limitation of mouth opening (i.e. opening to less than 4 cm. at the incisors) and, of course, no inflammation around the ampulla of the parotid duct as seen in mumps.

The condition is caused by a vicious circle set up when inflammation of the overlying gum causes it to impinge on the upper wisdom tooth. It can be relieved by extraction of the upper wisdom tooth, and later resolved by surgical extraction of the lower wisdom tooth. This is a purely dental problem that often presents to the doctor and is not adequately treated by antibiotic therapy without reference to a dental surgeon.

I should like to express my debt to Mr. Gordon Ashcroft for his inspiration and help and also to Dr. G. W. Hadfield with whom I gave a lecture on the subject to the Reading Pathological Society.

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PSYCHIATRIC DISCHARGE FROM THE ROYAL AIR FORCE IN PEACE-TIME

(A FOLLOW-UP STUDY)

By F. G. SPEAR, M.B., Ch.B., D.P.M.
Registrar, Barrow Hospital, Barrow Gurney, near Bristol;
Formerly Medical Officer, Royal Air Force

During and immediately after periods of war many men are discharged from the Armed Services on psychiatric grounds. At these times the types of men discharged have been studied and considerable attention has been paid to their difficulties in resettlement in civilian life. Although American authorities (Malamud and Stephenson, 1944; Braceland and Rome, 1944) are in general optimistic about resettlement possibilities and find their hopes confirmed by follow-up studies (Brill, Tate and Menninger, 1945), studies made in this country show a less encouraging picture. The studies of Lewis (1943) and Guttmann and Thomas (1946), for instance, reveal that in this country many men had difficulty in finding employment at the level at which they were working before entering the Service, whilst 75 per cent. of them required further medical attention in civilian life.

As Britain still retains large Armed Services in peacetime, partly by conscription, although this is virtually ended, and as there are still men in the Forces who are mentally unsuitable and who must be discharged, many practitioners will from time to time have a patient who has been so discharged. It was therefore felt that a brief account of a follow-up of some of these patients would be of some interest.

METHOD

During my period of service in the Royal Air Force I collected details of 91 consecutive admissions to the ward in the Neuropsychiatric Centre which was under my control. These 91 cases are the basis of this study. The ward to which the patients were admitted was 'open' and was not staffed for the full twenty-four hours. Normally, airmen and junior N.C.O's who were suffering from neurotic or early and mild psychotic illness were admitted, usually after outpatient screening. From outpatients the policy was to admit only those patients who could be treated before returning to duty, who needed treatment before discharge to civilian life, or who presented with symptoms suggestive of a major psychiatric illness. The Royal Air Force demands a high standard of physical and mental fitness and most of these men were discharged from the Service; only a few men with high motivation

to continue service and with a good personal and service history were retained. Apart from Service requirements separation was in the best interest of all patients and in accordance with the wishes of most of them.

The mean age of this group of patients when first seen was 22.7 years and the extremes of age were 15 years and 47 years. As would be expected from the admission policy of the ward, however, the distribution was skewed, as shown in table I.

A questionnaire was sent to each man at least eighteen months after his discharge from hospital asking whether he had had recurrence of neurotic

Age (years) ..	15 to 19	20 to 24	25 to 29	30 to 34	35 +
Number of patients	22	51	8	8	2

TABLE I.—Age-distribution of 91 patients on admission to a R.A.F. Neuropsychiatric Centre.

	Depression (reactive and endogenous)	Schizophrenia	Anxiety state	Hysteria	Psychopathy	'Temperamental instability'	Other	N.A.D.
Total	13	8	14	7	9	20	12	8
Gross home difficulties	9	2	8	2	8	8		
Discharged from Service	10	8	9	6	8	20	11	
Number of replies ..	6	5	11	6	5	13	8	4
Recurrences ..	1	5	4	2	1	7	2	
Difficulties with work attributed to illness	3*	4	1	2	3	—	1	
Mean number of jobs held	1	4.2	2.5	3.75	1.6	1.5		

*Patients remaining in Service.

TABLE II.—Summary of findings in survey of psychiatric discharges from the R.A.F.

symptoms, whether these had required treatment from family doctor or specialist, or admission to hospital. He was asked whether he had difficulty in obtaining work, if he attributed any difficulty to his illness and how many jobs he had held since leaving the Service.

As the sample is small and there are many variables, no statistical computations have been made, but it is probably representative of a great number of young men discharged from the R.A.F. on psychiatric grounds.

RESULTS

Of all the men in the sample 14 were National Servicemen, 12 were serving three-year engagements and 65 had signed on for four years or more. The man serving for three years is often, and normally justly, regarded as a National Serviceman at heart and has therefore been separated out from the true regular. There seems to be no tendency for breakdown to occur at any particular period of a man's service.

The main results of the study are summarized in table II. Although data were collected on the whole sample about their work record, schooling, size

of and position in family, sexual activities and home circumstances, none of these factors except the last seemed to show particular features occurring with any frequency either in the whole sample or in the differing diagnostic groups. A patient was counted as having experienced home difficulties if it was elicited in the history that his parents were divorced or separated, that either or both were dead, psychotic (usually inpatients in mental hospitals) or suffered from severe and prolonged physical illness. Two of the psychopathic patients were also included because they remarked spontaneously that their home life had been most unhappy. The incidence of home difficulties was striking in the psychopathic group.

From table II it will be seen that the distribution of replies and refusals is even throughout the main diagnostic categories. It is assumed that the patients who replied represent a reasonable sample of the whole group. The outstanding differences are related to the data classified in the table as 'other'. This group includes four cases of sexual perversion, three homosexuals and one transvestist. These all failed to reply.

The distribution of cases in the main diagnostic categories is shown in table II. Reactive and endogenous depressions are included in one class because, although there were often clinical features suggesting endogenous illness in some cases, reactive features were prominent in all of this group. Schizophrenia is seen very early in the Service but the diagnosis was based on the observation of two or more of the basic signs of autism, incongruity or gross blunting of affect and thought disorder. Men with gross delusional ideas did not come into this sample.

Whilst 'temperamental instability' is a useful concept in aiding the discharge of Servicemen an attempt was made to limit its application and to use more recognized diagnostic terms when possible. In this study the term is applied to the patient who develops symptoms in response to the normal stresses of Service life. These symptoms are usually somatic—most frequently headaches—are closely related to Service life, and often disappear during a week at home and occur in a man with previously apparently sound personality and a good work record. In some cases there seems a high probability that the man is malingering, but normally the patient's statements are accepted. They, and the R.A.F., are improved after they have left it. From the replies it seems that there is a high recurrence rate in this group, about half the men saying that they still have symptoms. Despite their symptoms they have little difficulty at work and the mean number of jobs at 1.5 in eighteen months is quite reasonable. It would appear that members of this group are likely to visit their doctor with minor complaints and some of them have been sent for further psychiatric advice but their illness really interferes very little with their lives. They could almost be considered the essentially dissatisfied members of the community.

The diagnosis of psychopathy, made in this group on the basis of inadequate or anti-social behaviour, from pre-Service work record and lack of foresight in the previous management of their affairs, does not seem to have

been related to a poor prognosis. More clear-cut neurotic syndromes were quite common and tended to recur as would be expected. The effects of these illnesses on work record were not marked. Schizophrenia implies and shows a poor prognosis and all the patients who replied had had one or more admissions to a mental hospital since leaving the R.A.F. One patient, discharged from the R.A.F. with an anxiety state, subsequently suffered a head injury and post-traumatic epilepsy. He has had many fits and has held nine jobs, and is now out of work. His case has been excluded from table II.

CONCLUSIONS

Conclusions drawn from this study are necessarily impressionistic. First, trite but important, that discharge from the R.A.F. on psychiatric grounds is not *per se* a source of difficulty in civilian life nor does it always imply need for further medical attention. Problems in this direction are related to diagnosis and if the practitioner is in doubt further information should be sought. This can usually be obtained from the Air Ministry.

Secondly, it would seem unlikely that re-enlistment of members of this group would ever be successful. Although under different conditions and more effective motivation some of them may be of value, many would become the regular hangers-on of the sick parade. Their use to the Service would be slight and their adverse effects on morale might be considerable.

SUMMARY

Many men are discharged from the R.A.F. on psychiatric grounds in peacetime and may come before the practitioner with this 'label'.

A sample of ninety-one consecutive admissions to a R.A.F. psychiatric ward was investigated with regard to their work record, schooling, size of family, position in family, sexual activity and home background.

A postal follow-up was carried out.

Replies and refusals were evenly divided in the major diagnostic categories.

The sample was probably representative of the majority of young men discharged from the R.A.F. on psychiatric grounds.

No factors in the history seemed reliably to indicate liability to breakdown. Prognosis is related to diagnosis and not psychiatric discharge *per se*. It is unlikely that these men would be of value to the Service if allowed to re-enlist.

I am grateful to the Air Ministry for permission to publish this report and to Group Captain R. J. A. Morris and his staff at M.A.7. for help in finding the addresses of the men followed up. Opinions expressed are those of the author and do not necessarily reflect Air Ministry opinion or policy.

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GENERAL PRACTITIONERS' FORUM

DERMATITIS DUE TO SYNTHETIC DETERGENTS

By H. S. SAMUEL M.R.C.S., L.R.C.P., D.C.H.
General Practitioner, Theale, Berks.; Clinical Assistant in Dermatology, Royal Berkshire Hospital, Reading

AT the present time much is written and talked about dermatitis due to detergents, and a great many people believe themselves to be suffering from this complaint. In view of the vast use of detergents at the moment (41,000 tons per annum in Great Britain), it seemed worth while to examine the extent of such dermatitis in Reading and the nearby area of Berkshire, to describe its effects, and to suggest methods for its prevention.

THE NATURE OF DETERGENTS

All soap and soap-like substances used in washing are 'detergents'. In popular parlance, however, the term refers to the new synthetic detergents, and it is in this sense that the term is used in this article.

These are prepared by cracking and oxidation of high petroleum waxes with sulphuric acid. The commoner ones in modern commercial preparations are aryl alkyl sulphate or sulphonate and secondary alkyl sulphate. Synthetic detergents as sold are mixed with varying proportions of substances known as 'builders'; and the proportion of these substances (chiefly carbonates and silicates, complex polyphosphates and carboxymethylcellulose, together with sodium sulphate) varies according to the use designed for the product by the manufacturers. In any given detergent, anything up to 70 or 80 per cent. of the actual substance sold in the packet consists usually of 'builders'. The detergents prepared for the washing of fine fabrics usually contain a larger proportion of 'builders' than those designed for the washing of dishes, coarse fabrics, and the like. Other substances, such as fluorescein, are added to some commercially sold detergents for the purpose of producing whiteness or apparent whiteness.

MODE OF ACTION

The synthetic detergent proportion of the products sold to the public consists usually of surface-active agents possessing wetting, emulsifying and dispersing powers due to the water-repelling groups present in their chemical composition which are usually linked with one or more water-attracting groups. Both groups are active in removing dirt from the substance to be washed. The surface-active agents alter the properties of the contiguous surface layers to bring surfaces into more intimate contact, whilst lipophylic and hydrophylic properties are present in the 'builders'. In addition, of course, the rubbing and moving of the articles to be washed, together with the movement and friction of the water, and possibly by the hands, or rollers, or other mechanism of the washing machine, all help to remove dirt from the substance. In other words, surface tension is altered in the process of washing with detergents.

There are thus many methods of action in the ordinary washing of clothes,

hands or other articles: deflocculation, emulsification, physical removal, foaming and detergency, are all in part by-products of the surface action. Foaming in itself—although popular as a sales attraction to housewives—does not indicate to any great extent the cleansing power of the detergent.

USE OF DETERGENTS

To determine the percentage of housewives in the Reading area who used detergents at a given time, 559 housewives in my general practice were asked whether or not they used synthetic detergents in their homes. The term 'synthetic detergent' was carefully explained to them, together with the brand names of some of the better-known products which were detergents, and one or two others, which were soap, so that they might avoid a mistake. 517 (or 92.5 per cent.) replied that they used synthetic detergents. Dr. J. Beatson Hind has kindly collected from his area in Birmingham a similar set of figures. He asked 500 of his patients the same question; and 268 (or 53.6 per cent.) replied 'yes'. Birmingham is, of course, a soft water area whereas Reading is an area of exceptionally hard water, the average hardness of the water being twice the national average. Lyon (1956) points out that in English households in 1956 three out of four (or 75 per cent.) used synthetic detergents at some time during a three-month period. He did not specify whether this figure was for a hard or soft water area or included both. The average figure for detergent use in hard and soft water areas, obtained by adding together Dr. Beatson Hind's figures and my own, and dividing the two, is 73.05 per cent. This is very similar to the 75 per cent. found by Lyon.

Thomas Hedley & Company have supplied figures from their Research Department of recent use of synthetic detergents and soaps in households at the present time.

These show:—

Synthetic detergents
In a hard water area, 92 per cent. of households use them
In a soft water area, 78 per cent. of households use them
Average 85 per cent.

Soap products
In a hard water area, 72 per cent. of households use them
In a soft water area, 92 per cent. of households use them
Average 82 per cent.

The figures for the use of soap products show that the same households use both soap and synthetic detergents either at the same time for different purposes or at different times. The percentage figures for the use of synthetic detergents should not therefore be taken to mean exclusive use of these detergents for either washing-up or washing.

These figures, although very helpful, show partly the complications involved in endeavouring to work out the actual percentage of English households in which detergents are used at the present time. The probable increase in use of detergents has not resulted in any apparent increase of synthetic detergent dermatitis, the figures obtained in the Royal Berkshire Hospital in 1956-1957 being comparable with those of earlier years in the

Leeds General Infirmary and St. John's Hospital for Diseases of the Skin.

In gross tonnage there is probably about an equal amount of synthetic detergents and soap products used in the country as a whole.

INCIDENCE OF DETERGENT DERMATITIS

Analysis by Lyon (1956) of 3,121 cases of detergent dermatitis showed that 50 per cent. were aged 40 to 60 and that 88 per cent. were females. He found also that the worst period for the incidence of the disease was January to April coinciding with the period of cold weather and lowered relative humidity. Incidentally, he found that the average period of treatment for cases of synthetic detergent dermatitis was eleven weeks and 58 per cent. of the patients had a recurrence within one year.

Of the 1,438 new cases (607 men and 831 women) attending the Skin Department of the Royal Berkshire Hospital during 1956-57, 13 (10 men and three women) were diagnosed as having dermatitis due to synthetic detergents: an incidence of 0.9 per cent. Six of these were over 40 years of age. Although the number of cases is comparatively small, the incidence is comparable with that recorded from other hospitals with larger numbers of cases.

The records of St. John's Hospital for Diseases of the Skin, Leicester Square, for instance, over the period 1952-1954 show that 1.3 per cent. of patients attending there had what is described as 'dermatitis due to alkalis' (Calnan, personal communication). The majority of these cases had dermatitis considered to be due to synthetic detergents, but some of them had dermatitis from other causes. Figures from the Leeds General Infirmary in 1952 also show that 1.3 per cent. of new patients in the Skin Department there were suffering from what is described as 'household dermatitis'—a term no doubt including dermatitis due to synthetic detergents as well as a small proportion of cases due to other causes. This figure from Leeds General Infirmary shows no increase, incidentally, over similar figures for the period 1942-1952; i.e. for a considerable period preceding the introduction of synthetic detergents.

In addition to the scrutiny of the records of patients attending the Royal Berkshire Hospital, 144 new patients, not suffering from detergent dermatitis, were given a questionnaire which asked, amongst other things, whether they had or had not suffered from detergent dermatitis. Thirteen of these (9.24 per cent.) replied 'yes', and of these 11 (82 per cent.) were over 40 years of age, and 10 were women. Of these 13 patients, only one had a record of treatment for this complaint at the Royal Berkshire Hospital. Some of these patients claiming to have suffered from detergent dermatitis may have been treated by their own general practitioners, but this question was asked of each of the 144 patients, and only two replied 'yes'. As the period over which the detergent dermatitis is alleged to have occurred is unspecified this may partly account for the larger percentage, but, even so, a figure ten times as great as that found in three different skin departments is unlikely in fact.

It would appear that the extent of synthetic detergent dermatitis which exists in the public mind is far greater than that which exists on examining hospital records. The probable explanation is that almost any form of skin

disease of the hands or arms is liable to be attributed by the public—and particularly by housewives—to the use of detergents. In a great many cases housewives give a history of being unable to use a certain detergent and will tell the doctor that they have given it up on account of the dermatitis produced. This statement on their part may or may not actually be true. A small proportion of cases of detergent dermatitis may possibly not come to light, because of this habit of avoidance by housewives of the detergent which they think, rightly or wrongly, causes them to have dermatitis.

CLINICAL FEATURES OF DETERGENT DERMATITIS

One of the best descriptions of detergent dermatitis was given by Hollander (1957), according to whom it usually begins under the rings, if worn, as a mild vesicular eruption, spreads to the sides of the fingers, and the dorsum of the hands, dorsum of the forearms and so on. Acute flare-ups on the wrist, and sometimes on the face, are not uncommon, and produce lesions varying from mild oozing to a confluent pustular rash.

CAUSES OF DETERGENT DERMATITIS

The possibilities of dermatitis from the action of washing with synthetic detergents may therefore arise from a number of different causes and actions; some in themselves are necessarily due to the chemical composition of the detergent itself. Similar possibilities of harm exist from washing with soap or any other washing agent which works in the same way: e.g. by altering surface tension and by the other methods already described. In 1936, for instance, before the introduction and common use of synthetic detergents, Jordan and his colleagues showed that 14 per cent. of normal people and 50 per cent. of patients with dermatitis gave a positive patch test to soap. Even though, as will be discussed later, the patch test itself may not be of any vital significance in assessing the incidence and likelihood of detergent dermatitis, this example serves to show that the problem of detergent dermatitis arose long before the introduction of synthetic detergents into common use.

Following exposure to a solution of either soaps or synthetic detergents, the majority of people experience a rise of skin pH from 0.6 to 1.8 in the portion of the skin exposed to detergent. This returns to normal after fifteen to ninety minutes. The longer the exposure to the detergent solution, the longer the time the skin pH takes to return to normal, and frequent and long exposure impairs the skin's power of neutralizing the rise in pH. Too alkaline a solution is obviously caustic, and no detergent manufacturer puts upon the market a detergent which gives a pH much higher than 10, and most solutions or powders as sold to the public are buffered so that, whatever the solution, the pH remains the same.

According to Burckhardt (1947), Klauder and Gross (1951) and others, decreased skin resistance to alkalis follows decreased powers of neutralization by the skin due to frequent and prolonged immersion in alkaline

solutions of soap or detergents, and this predisposes to detergent dermatitis as a form of irritation. Jambon and Susskind (1955) did not find detergents to act as primary sensitizers even when detergent dermatitis existed. On the other hand, Goldman (1935, 1936) points out that alkalinity in soap is not the key, as the most alkaline soaps are not the most irritant. This would seem to indicate that primary irritation plays a larger part than sensitization in the causation of this disease. Alkyl sulphonate and aryl alkyl sulphate are indicted as the worst irritants in synthetic detergents both in the United States (Jordan *et al.*, 1936) and in Denmark (Nilzen, 1958). Alkalinity by itself, however, is not the chief factor in producing irritation or sensitivity. Blank (1939), Jordan *et al.* (1936) and Emery and Edwards (1940) consider that in the presence of skin secretions alkali may be more irritant than alkali by itself. Van Scott and Lyon (1953), however, deny this. Bacterial infection may play some part; Arnold, in 1942, showed that a skin pH on the acid side discourages skin bacteria whereas an alkaline pH encourages them. An important and undenied factor in the production of dermatitis is trauma. Argument still exists as to whether synthetic detergents or soaps are more defatting to skin but an important factor in the defatting with either agent is the amount of fluid in the horny layer. Loss of fluid from the horny layer has a direct relationship to the relative humidity of the atmosphere and 60 per cent. or more of dermatitis cases analysed in correlation with a chart of the relative humidity showed exacerbation during periods of lowered relative humidity (i.e. in cold weather).

Van Scott and Lyon (1953) also suggested that denaturization of keratin is another possible mechanism in the production of this disease, up to 43 per cent. of sulphydryl groups being unlinked in denatured keratin.

Trauma, strength of solution and lowered relative humidity are all proven causes of detergent dermatitis as are time and frequency of immersion of the hands. Alkalinity and the other causes are still a matter of argument. Primary irritation is the chief cause but sensitization may and does occur also. The patch test is notoriously unreliable in this as in other forms of dermatitis, but of those patients giving a positive patch test to synthetic detergents after six days, 100 per cent. continue to give it at the end of one year. In addition, it is known that synthetic detergents may produce sensitivity to metals not present before the skin was exposed to detergents. The return of the skin pH to normal takes the same time whether immersed in solutions of detergents or soaps.

CONCENTRATION USED

Figures for the concentration of detergents used or suitable for use vary considerably according to the sources from which they are derived. According to Lyon (1956), the concentration of detergents used varies on the average from 0.26 per cent. to 0.3 per cent. According to Unilevers, it is 0.4 per cent.; as a detergent usually contains only from 20 to 30 per cent. of surface-active agents, this equals 0.08 to 0.12 per cent. of actual surface-

active agents. According to the same source, the concentration used in washing dishes is only one-quarter of that used for washing clothes. Obviously, however, owing to the common habit of housewives of tipping in an approximate amount of detergent which is seldom accurately measured, the percentage of detergent used must vary considerably.

Twenty-seven samples of detergent solution prepared by my patients for the purpose of either washing dishes or washing clothes, taken at random from patients who had been carefully asked not to alter in any way the usual concentration of detergent used by them, were analysed by the Colgate Palmolive Company, and gave the following results:—

Nineteen samples of detergent solution prepared for washing dishes were analysed. The concentration of surface-active agents varied from 0.01 to 0.24 per cent., the average being 0.064 per cent. (Two of the larger detergent manufacturers in the country stated that 0.02 per cent. is the desirable proportion of detergent solution for washing-up).

Eight samples of detergent solution prepared for washing clothes were analysed and gave percentages of detergent varying from 0.03 to 0.98 per cent. of active agent, the average concentration being 0.24 per cent. (The concentration quoted as desirable by the manufacturers is 0.04 per cent.)

Thus, the average concentration of detergent used for washing dishes was three times as high as is necessary, and for washing clothes six times as high. Of the 19 examples of detergent used for washing dishes analysed, only three contained a proportion of detergent below that described by the makers as desirable; one was over ten times as heavy a concentration as required. Of the eight samples for washing clothes analysed, only one was below the percentage described by the manufacturers as desirable. The heavy excess of detergents used by housewives even in this comparatively small number of cases would seem to indicate that on the whole housewives are using too much detergent. Washing of the hands is seldom deliberately done after washing-up. Of 113 of my patients in general practice who were asked if they rinsed their hands in clean water after washing-up, only two replied 'yes', but it must be remembered that following the washing of clothes the rinsing of the clothes themselves in clean water tends to wash the hands of the housewife. A great many women also rinse dishes after removing them from the washing-up solution and before drying or racking, and this again washes the hands.

COMPARISON OF SOAPS AND SYNTHETIC DETERGENTS

In 1953, Johnson, and his colleagues in the United States gave 5000 women detergents and soaps of different types without telling them what type of product it was that they were using, and examined their hands carefully before and after a period of use of the particular product exclusively for not less than two weeks. Their results showed no marked difference in the hands of women, whichever of these particular substances (including both synthetic detergents and fine and coarse and household soaps) were used, after the period in question. A fine fabric soap had just, and only just, the best record, and next to this came the synthetic detergent, which gave fewer cases of

apparent injury to the hands than a No. 1 general purpose soap, and a better result than a coarse soap. It is interesting that the housewives' impressions of the mildness or otherwise of the washing agent corresponded exactly with the opinion of the dermatologist who examined the hands before and afterwards.

PREVENTION

It would appear that the incidence of synthetic detergent dermatitis is not nearly as high as the public thinks. Nevertheless, it is a definite entity, although its existence, or the existence of a similar disease, long preceded the introduction of modern synthetic detergents. This, however, did not seem to excite public interest and alarm to anything like the same extent as today. One explanation for this is the excessive and unhealthy preoccupation with medical matters on the part of the public which exists at the present day. This is fostered and encouraged by the innumerable radio and television presentations of medical programmes, which seem to do little but excite and increase an already existing health hysteria. It is therefore particularly important, both from this point of view and in order to reassure the public and establish a correct attitude on their part, that we should determine the measures that can be taken to prevent such incidence as there is. These include:—

(1) The avoidance of too frequent, and too prolonged, exposure to detergent solutions.

(2) Careful rinsing of the hands with clean water after use.

(3) The measuring of a careful amount of detergent solution for the purpose required. It would be of considerable help if manufacturers would indicate on their packages the proportion of their product that should be used per pint or gallon of water for washing, washing-up, and the like. It is possible that some housewives might adhere to this.

(4) Continued research into the production of commercial detergents which minimize its incidence.

SUMMARY

(1) The nature and action of synthetic detergents are described. They alter surface tension and also act by wetting, deflocculation, emulsification, foaming, and physical removal of dirt.

(2) Of 1,438 case records analysed from the new patients attending the Royal Berkshire Hospital skin clinic, 0.9 per cent. showed dermatitis due to synthetic detergents. This compares quite closely with the figures of two other large skin departments. A much larger proportion (9.24 per cent.) of the 144 patients questioned in the Royal Berkshire Hospital outpatient department as to detergent dermatitis claimed to have suffered from it at some time, over an unspecified period.

(3) The factors in the incidence of detergent dermatitis are considered, and include the frequency of use of detergents, absence of rinsing of hands, the time and frequency of immersion, and—very important—the relative humidity of the atmosphere at the time.

(4) The question of the pH of the skin as a cause of either primary irritation or sensitization is considered, but the modern tendency is to discount it as an important cause of detergent dermatitis. The pH of the modern commercial detergent used for household purposes seldom exceeds 10.

(5) Methods of preventing detergent dermatitis are considered.

I would like to thank Dr. Hugh Calvert, dermatologist to the Royal Berkshire Hospital, without whose constant help and encouragement this report would never have been started or finished; Dr. J. Beatson Hind, who spared time from his busy practice to help; Thomas Hedley & Co. for repeated help, and supply of usage figures; Dr. J. B. Lyon for continued personal assistance and the privilege of reading his M.D. thesis; the Colgate Palmolive Co. for analysing detergent solutions sent to them; Dr. A. Barr for his helpful criticisms; M. E. A. Burton, head pharmacist to the Royal Berkshire Hospital, for considerable help; and Mr. J. Wheeler, of the Records Office, Royal Berkshire Hospital, for much time in helping me to search the hospital records.

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DEPRESSION IN GENERAL PRACTICE

A Clinical Trial of a New Psychomotor Stimulant

By GABRIEL V. JAFFÉ, M.B., B.S.
Bournemouth

One of the oldest and most universal symptoms known to mankind is depression. Modern life imposes its stress and strain on everyone and as a result many people, although not physically or organically ill, are occasionally depressed. These patients are a comparatively neglected group of individuals for whom a safe reliable psychomotor stimulant would be invaluable. There is also a large group of incurable patients—those with malignant diseases, the chronically ill, the aged, and many convalescent patients—all of whom need some form of medication to give them mental uplift. The depression and lethargy caused by continued therapy with barbiturates, chlorpromazine, antihistamines, anticonvulsants and Rauwolfia, have also increased the need for such a drug. Few effective stimulants have been developed since mixtures

of iron, quinine, strychnine, and caffeine. The amphetamines were introduced in the 1930's but, because of the depressant effects on appetite, the excessively high peaks of stimulation, the effects on blood pressure and other side-reactions, they also have limited application.

Recently, methyl phenidate ('ritalin') has been introduced. It is free from the harsh sympathomimetic action and rebound depression of the amphetamines. Pharmacological work in animals shows that the action of the drug lies between amphetamine and caffeine. It has little or no effect on appetite when given by mouth. Its action is smoother and less likely to cause agitation and tension than the amphetamines. It has no significant effect on the blood pressure, respiration or heart rate. Methyl phenidate has been studied extensively in psychiatric patients but few reports on its use in general practice have been published. Reports indicate an excellent response to the drug in overcoming chronic fatigue, sedation seen during Rauwolfia or chlorpromazine therapy, psychotic depressions and depressions associated with the menopause, and nervous exhaustion. No adverse effects have been found on the blood, urine, liver or kidney function. Except in rare instances, it does not depress appetite. The purpose of this study was to evaluate methyl phenidate in everyday general practice.

Type of depression	No. of cases	Percentage of total
Reactive	14	26
Endogenous	12	22
Psychoneurotic	8	15
Organic and toxic	11	20
Senile	9	17
Total	54	100

TABLE I.—Classification of 54 patients with depression, treated with methylphenidate.

MATERIAL AND METHOD

Fifty-six unselected consecutive patients with moderate or severe depression, who had suffered from symptoms for at least one month without change, were included in the trial. One of these left the trial because of side-effects while on methyl phenidate and another emigrated, reducing the final trial population to fifty-four. There were 20 males and 34 females, the average age being 49 years; the average duration of symptoms was 27 weeks, and the average duration of treatment was 17 weeks.

The dosage used was one 10-mg. tablet three times a day, the last tablet to be taken not later than 18.00 hours. It was thought that treatment with methyl phenidate should be continued for at least one month to give a true picture of the response to the preparation and to eliminate chance fluctuations in the patient's condition. After initial interview and assessment (table I), the patients were seen at weekly intervals, at which time the result of the previous week's treatment was noted. To eliminate personal views in assessing the results, the patients were requested to complete a form putting their response in one of the following categories—complete relief, marked improvement, no change, worse, or much worse—and also to record if the

tablets had affected them in any other way, thus enabling side-effects to be noted.

RESULTS

The results, as summarized in tables II and III, show that methyl phenidate is an effective compound giving complete or marked relief in two-thirds of the patients. Particularly good results were obtained in the treatment of organic and toxic depression, all the eleven patients treated being markedly improved or completely relieved. Endogenous depression also responded well, ten out of twelve patients reacting similarly. Reactive depression conversely responded poorly, only one out of fourteen patients being relieved, and in two patients the depression became worse after treatment. This is not altogether surprising because the nature of acute reactive depression might be expected to call for treatment additional to that of a psychomotor stimulant alone. Senile depression responded well, seven out of nine patients showing complete relief or marked improvement. Psychoneurotic depression responded favourably in only three out of eight cases, and two were worse after treatment.

Sex	Age	Duration of depression (weeks)	Duration of treatment (weeks)	Side-effects	Results
Reactive depression					
F	38	12	6		O
M	36	4	4		+
F	39	12	4	A	++
F	17	4	12		—
M	54	9	12		O
M	44	4	12		O
M	22	4	16		—
F	39	12	12		O
F	20	18	18	SN	—
M	44	4	12		+
F	22	8	10		O
F	81	53	13		O
M	37	8	16		+
M	23	12	10		O
Endogenous depression					
M	42	52	12	A	++
M	40	24	18		++
F	41	44	26	SR	+
M	36	6	18		++
M	38	16	12		++
F	46	32	52	S	++
F	67	38	52	S	++
F	41	18	12		++
F	40	30	22		O
M	46	36	30		++
M	40	35	22		+
F	46	36	24		O
Psychoneurotic depression					
F	63	26	18	SA	+
F	49	12	12		++
F	51	18	18	S	O
F	59	36	18		—
F	62	16	20		O
F	71	12	36		O
M	57	13	18		+
F	20	4	38	SN	—
Organic and toxic depression					
F	48	13	4		++
M	47	4	8		++
M	41	12	4		++
F	50	8	8	A	++
F	58	13	8	A	++
F	67	6	6		++
F	67	12	8		++
M	37	16	4		++
F	31	18	12		+
M	42	6	10		++
M	44	12	4		++
Senile depression					
F	72	52	10		+
F	84	156	12	N	++
F	79	22	26	S	++
F	71	58	26	S	+
F	78	24	36		+
F	77	110	52	SN	O
M	78	52	30	S	+
F	77	48	20		++
F	69	104	48	AN	O

O = No change. + = Improved. ++ = Complete relief. — = Worse.
Side-effects: A = Anorexia. N = Nervousness. R = Rash. S = Sleeplessness.

TABLE II.—Summary of results obtained with methyl phenidate in the treatment of 54 patients with depression.

SIDE-EFFECTS

There were no serious side-effects but, of the 17 patients in whom side-effects did occur, 11 patients were aware of sleeplessness, six of anorexia, one of a rash and five

Result of treatment	No. of cases	Percentage of total
Complete relief	23	43
Marked improvement	12	22
No change	14	26
Worse	3	5
Much worse	2	4
Total	54	100

TABLE III.—Showing the over-all response to treatment.

of increased nervousness. These side-effects were mild and necessitated a break in treatment only in the case of the rash.

It has been reported that methylphenidate potentiates the action of alcohol. Caution may therefore be advisable if the two are likely to be taken together, although in the present series this problem did not arise.

DISCUSSION

It has been estimated that the incidence of depression in Britain is at least 7·5 per thousand population and recent reports confirm the assumption that a vast number of depressives visit the doctor's surgery daily. The general practitioner is in a unique position in that he is probably the first person, outside the patient's immediate family, to advise and help in regard to the assessment and treatment of depression. The distress and suffering of patients who are depressed have received less attention by the medical profession as a whole than the situation demands. There are probably two main reasons for this. The first is that depression is a subjective condition and usually no obvious harm will come to the patient even if untreated. Secondly, people have come to accept this symptom as an inevitable concomitant of modern life. From the general practitioner's point of view, the only object is the relief of symptoms and their underlying cause. Organic disease must therefore be excluded and an attempt made to provide symptomatic relief.

The basic N.H.S. cost of one week's treatment with methyl phenidate averages just under 2*s*.

SUMMARY

In a group of 54 consecutive patients seen in a general practice, and treated by oral methyl phenidate, there was a marked over-all improvement.

Two-thirds of the patients obtained complete relief or marked improvement. Depression due to organic and toxic causes reacted most favourably. Endogenous depression responded well; likewise senile depression. In psychoneurotic depression the results were variable, and in reactive depression, poor.

I should like to thank CIBA Laboratories Ltd., for their advice in planning this trial.

GENERAL PRACTITIONER CLINICAL TRIALS

AN AEROSOL SPRAY FOR LOCAL ANÆSTHESIA

BENZOCAINE has a number of uses in general practice as a local anæsthetic by application in the form of ointments and creams. Such preparations, however, are often 'messy' to apply, and the local anæsthetic effect variable in action. 'Nestosyl' aerosol is a preparation of benzocaine in aerosol form, for which it is claimed that good skin penetration is achieved and that local anæsthesia can be more efficiently produced. This could be extremely useful for undertaking minor surgery, particularly in children in general practice. The preparation can also be used in a number of conditions, when it is desired to produce local anæsthesia for the relief of symptoms, although some doctors may feel that it is harmful to use local anæsthesia for this purpose.

SCOPE OF INVESTIGATION

The five doctors taking part in this trial used the preparation in a total of 49 patients, and the conditions for which it was used were mainly in the production of anæsthesia for minor surgery, for the relief of symptoms in piles and ano-genital pruritus, and for the relief of pain in superficial skin lesions.

RESULTS

The results are divided into two sections: those procedures involving a single application, and other conditions in which multiple applications were required. The results are summarized in tables I and II.

Single procedures.—It is seen from table I that complete or partial anæsthesia was obtained in 12 out of 16 of the procedures, although the effect was not very satisfactory for skin or perineal suturing. Possibly the preparation does not penetrate sufficiently deeply for this purpose, as the best effects were obtained in superficial skin conditions, where only a thin layer of skin had to be incised. Since the time taken for anæsthesia to develop in the majority of cases was between two and five minutes, it is probably necessary to allow at least four minutes between applying the spray and undertaking the minor surgical procedure in the majority of cases.

Frequent applications.—It is apparent from table II that a satisfactory anæsthetic effect was obtained in the majority of these cases also, the time of onset of anæsthesia usually being rather shorter than in the previous cases: namely two to three minutes in the majority. The duration of effect ranged from only one or two hours in some cases, to all day in others.

Subsequent course of medical cases.—In trying to determine the usefulness of such a preparation in the treatment of the medical conditions listed, it is necessary to know the eventual outcome of these cases. It will be seen from table III that the aerosol provided a satisfactory treatment for the

majority of cases of hæmorrhoids, although in one-third of these cases other treatment had to be substituted for one reason or another. On the other hand, in cases of ano-genital pruritus, the aerosol was not very satisfactory, as three-quarters of the cases required other treatment.

SIDE-EFFECTS

No side-effects were experienced by 57 per cent. of these patients, but initial stinging on application of the aerosol was troublesome in 35 per cent. of

Condition	Anæsthetic effect			Time for onset of anæsthesia			
	+	±	—	1 minute	2 to 3 minutes	4 to 5 minutes	Not recorded
Skin suturing	—	2	1	—	—	1	1
Perineal suturing	—	—	2	—	—	—	—
Lip suturing	—	1	—	—	1	—	—
Incision of whitlows	2	—	—	—	—	2	—
Incision of gum abscess	1	—	—	—	1	—	—
Removal of foreign bodies	2	—	1	—	1	1	1
Removal of warts	—	1	—	—	1	—	—
Venesection	1	1	—	—	2	—	—
Removal of dressings	—	1	—	1	—	—	—
Totals	6	6	4	1	6	4	2

TABLE I.—Results of one application of 'nestosyl'.

Condition	Anæsthetic effect			Time for onset of anæsthesia				Duration of effect			
	+	±	—	1 minute	2 to 3 minutes	4 to 5 minutes	6 to 10 minutes	1 to 2 hours	3 to 5 hours	6 to 9 hours	10 to 12 hours
Hæmorrhoids	8	5	1	1	9	—	2	3	2	2	6
Ano-genital pruritus	5	1	1	2	4	—	—	2	1	2	1
Dermatitis	2	—	1	—	1	1	—	—	1	—	1
Varicose ulcers and pressure sores	2	1	—	1	1	1	—	—	—	2	1
Burns	2	—	—	—	—	1	—	1	—	1	—
Lip fissure	—	—	1	—	—	—	—	—	—	—	—
Gum ulcer	—	1	—	—	1	—	—	—	—	—	—
Wound ulcers	1	—	—	1	—	—	—	1	—	—	—
Circumcision wound	1	—	—	1	—	—	—	1	—	—	—
Totals	21	8	4	6	16	3	2	8	4	7	9

TABLE II.—Results of repeated applications of 'nestosyl'.

cases, and severe in a further 8 per cent. This was a common cause of patients preferring to change to some other remedy. The only other side-effect of any importance was one case of sensitization rash, a recognized hazard with local application of benzocaine preparations.

CONCLUSIONS

It was concluded that the anæsthetic effect of the spray was fairly effective, except when deep penetration through intact skin was required. It was noted that between two to five minutes were required before the onset of anæsthesia in the minor surgical cases, and this might be some slight disadvantage during a busy surgery, when an injectable form of local anæsthetic would produce anæsthesia almost immediately. On the other hand, the spray is more convenient to use, and causes less upset in children than a local anæsthetic by injection. For the suturing of skin and other lacerations, the spray did not appear to be fully effective and would therefore be unlikely to be useful as a routine local anæsthetic for these purposes.

Condition	Satisfactory resolution				Became worse or other treatment substituted	Continued use for symptomatic relief
	1 week	2 weeks	3 weeks	Over 3 weeks		
Hæmorrhoids	5	2	1	—	4	1
Ano-genital pruritus	2	—	—	—	6	—
Varicose ulcers and pressure sores	—	1	—	1	—	—
Dermatitis	—	1	—	—	2	—
Lip fissure	—	—	—	—	1	—
Totals	7	4	1	1	13	1

TABLE III.—Results in various conditions treated with 'nestosyl'.

With regard to the medical conditions treated, there was some doubt on the part of some of the participants as to the wisdom of using a local anæsthetic for symptomatic relief in these conditions. Provided that care is taken to exclude infected skin conditions, however, a local anæsthetic can be extremely useful in most of these conditions, but some patients preferred ointments to the aerosol which was more difficult to carry around and use during their everyday life. The initial stinging caused by the aerosol in a fair proportion of cases was another reason for some patients preferring to use equivalent preparations in an ointment form. This seemed to be due to the propellant used in the aerosol. The most unsatisfactory feature in the treatment of the medical conditions listed was the number of patients transferring to another treatment, and this amounted to 40 per cent. of these cases.

It may therefore be finally concluded that this aerosol spray may be of some convenience to the general practitioner in dealing with superficial minor surgery, but has as many limitations as similar preparations in ointment form in the treatment of other conditions.

The following practitioners took part in this investigation:—
Dr. H. M. Clark, Twickenham, Middlesex
Dr. A. K. Cumming, Sturminster Newton, Dorset
Dr. L. V. Gimson, Canterbury, Kent
Dr. P. Schofield, Weybridge, Surrey
Dr. D. Wheatley, Twickenham, Middlesex

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SECTION OF GENERAL PRACTICE OF

THE ROYAL SOCIETY OF MEDICINE

DISCUSSION ON THE EARLY DIAGNOSIS OF CONGENITAL ABNORMALITIES

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Dr. Margaret Dudley-Brown (*York*).—My partner and I have cooperated in the survey on congenital abnormalities, organized by the College of General Practitioners, and have notified 32 children as having congenital abnormalities in a six-year period; this represents 50 per thousand live births, which appears to agree fairly well with other figures quoted. The following conditions were seen.

ANALYSIS

Pyloric stenosis.—We have had four cases in 7 years—all boys. As the ratio is usually said to be 4 males to 1 female, our next should be a girl!

Fibrocystic disease.—We have only one case—a child now aged 7 years, weighing 33½ pounds (15.2 kg.), 3 feet 4 inches (102 cm.) tall, and attending school. He was a first child, two weeks premature, and the onset of the fibrocystic disease was at 7 weeks with idiopathic œdema and hypoproteinæmia. There is no trypsin in the stools, and there was no chest infection during the first year of life.

Polycystic kidney.—We have had one case: a first baby, 2 weeks premature. As one-third of all cases of congenital malformations of the external genitalia are associated with malformations of the upper urinary tract, I should like to pose the question: 'Should all one's children with these malformations have an intravenous pyelogram at some time?'

I have one family in which the mother had a nephrectomy at the age of 40 for left hydronephrosis which was due to congenital narrowing of the pelvic ureteric junction. She has three sons, the eldest, aged 13, seems all right; the next, aged 11, has had a full repair of his hypospadias, whilst the youngest, aged 8, has had one attack of right-sided loin pain.

How far should we proceed in investigating these boys?

Deafness.—We have one case: a boy, the middle child of a family of three. His sister, aged 5, appears normal and a younger brother, under 2, is being watched very carefully by the E.N.T. Department. This boy's mother and maternal aunt were both born deaf and his father has acquired deafness from measles at a young age, so that his speech is also affected; conversational contact with the family is therefore difficult. The early diagnosis of deafness is most important in order to be able to teach speech. If these children go

to school too late they can learn to understand speech but cannot learn to speak.

Spina bifida.—We have two cases who have had rather gloomy histories. One mother had a spina bifida baby in 1954, who died soon after birth. In 1955, she had an abortion with considerable liquor amnii and an abnormal fœtus. The other mother had a normal child in 1954; a baby with spina bifida and meningocele, who died in a few days, in 1957; a 33-weeks' premature baby who died in forty minutes, necropsy revealing hydrocephalus and abnormal mouth and palate, in 1958. In 1960 she had a child who appears to be physically normal, but may be mentally retarded.

Mother's age	Place in family
34	Middle of 3
40	Third—first son
41	Youngest
30	Middle of 3
19	Eldest of 3
41	Youngest of 3
24	Second daughter
37	Fourth—one of twins
40	Only child

TABLE I.—Details of nine mongols

Bone dystrophy.—We have one family with a bone dystrophy, presumably sex linked. It is present in the mother and was also present in the grandmother whom I had as a patient before she died. The abnormality was gradually seen to manifest itself in the mother's daughter as a shortening and bowing of the legs and a marked coxa vara. The brother of 9 years is quite normal.

Congenital heart disease.—We have one interesting family in the practice. There is apparently no congenital heart disease among the relatives of the parents, Mr. and Mrs. S. They have had nine live children, the last of whom has a patent ductus arteriosus which has been operated on. In addition, Mrs. S. has had two stillbirths, due to toxæmia and prolonged labour. Of the 11 grandchildren, one of whom is adopted, three have proven patent ductus arteriosus and another almost certainly has, but a final diagnosis has yet to be established.

Mongols.—We have nine mongols amongst our patients. As will be seen from table I the mothers' ages are rather variable, one being only 19.

CONCLUSION

My own opinion is that, when possible, the general practitioner should be the one to break the news to the parents, as he is the one who knows the best time and place, and the type of parents with whom he is dealing. Once the parents have been told, every help must be given to them, and for this, many people are involved: e.g. the mental welfare officer, the welfare officer for the deaf, health visitors, hospital staff, school teachers.

While preparing this paper I went through a period of great depression in thinking, ' What good *is* early diagnosis other than for those who need operation?' On reflection, however, I am certain that it does help.

Dr. H. G. Farquhar (*Royal Liverpool Children's Hospital*).—Emphasis must be laid on the systematic examination of every new-born infant.

Abnormalities of the fontanelle, particularly accompanying premature stenosis of the sutures, must be considered, and those of the eyes, ears and mouth must not be overlooked. The importance of listening with the stethoscope at the nostrils to diagnose a choanal atresia is stressed. A short neck may be evidence of congenital abnormalities of the cervical vertebræ, and webbing of the neck may lead to a diagnosis of gonadal dysgenesis. Asymmetry of the chest and the classical signs of deviation of the mediastinum may suggest intrathoracic abnormalities, but minor degrees of asymmetry, although causing anxiety to parents, are usually of benign prognosis. In the diagnosis of congenital cardiac defects, cyanosis in the new-born period is a serious sign demanding special investigation. In the absence of cyanosis and symptoms, investigation is rarely indicated in early life and should be postponed. The error of diagnosing bronchitis or bronchopneumonia, in the place of cardiac failure, in infancy is common and understandable when the lung fields are filled with moist sounds. The technique of arresting respiration by compressing the infant's nostrils results in ability to hear the cardiac sounds. In the case of the alimentary system the signs of œsophageal atresia should be sought, and the absence of passage of meconium, abdominal distension and vomiting are warning signs of intestinal obstruction. Congenital galactosæmia and oligophrenic phenylketonuria are examples of congenital abnormalities which can be diagnosed by examination of the urine.

The importance of a systematic approach to the new-born infant and the importance of avoiding harm to the patient by unnecessary investigation cannot be overemphasized.

Dr. Ronald Mac Keith (*Guy's Hospital*).—Zeal in examination of small babies is promoted by cooperating in research and by adding to anatomical and physiological studies of developmental performance.

We can be alerted to the possibility of congenital disorders by the family history or the history of the mother's pregnancy. Often parents' fears are liars. There are disorders of dominant inheritance, such as achondroplasia, acholuric jaundice and some forms of myopathy, in which half the children may be affected. There are recessively transmitted disorders, in which a quarter of the children may be affected and a half may be carriers. The genes of some recessive disorders are carried on sex chromosomes, whilst those of others are on autosomal chromosomes. Hæmophilia and pseudohypertrophic myopathy are sex linked. Fibrocystic disease of the pancreas and phenylketonuria are transmitted in an autosomal recessive way. Perhaps

one in 16 people carries the gene of fibrocystic disease, so that one in 256 marriages can produce such children and 1 in 1000 children have the disorder. When the inheritance is not clearly dominant or recessive, the risks are usually low. In the case of mongolism there are two forms: children born to mothers over 40 and children born to young mothers. When a young mother has had a mongol, the risks of further mongols can be estimated more accurately if the chromosomes of the mother and the father are examined.

The mother's pregnancy history may give warning. If she has had rubella in the first three months, there is a 1 in 10 chance of an abnormal child. A new pet dog may have brought the risk of toxoplasmosis. Progesterone given in pregnancy may cause virilization in the baby. Hydramnios may be associated with atresia of the œsophagus or anencephaly. It has been suggested that the presence of only one umbilical artery is highly correlated to the presence of serious congenital abnormalities.

THE PROBLEM OF ADOPTION

To allow the adoption of a severely subnormal child is unfair to the adopting parents and to the child. It is often not possible to decide at birth, but at 3 months of age a skilled examination will detect the child who will later be severely subnormal. Shortly before the magistrate is due to legalize the adoption, there should be an examination by a pædiatrician especially interested and experienced in the problems raised by adoption, and the pædiatrician should himself see the adopting parents. It is tragically irresponsible of adoption societies that I am asked to fill in their forms of medical examination, without letting me have access to data of the child's family history, of the mother's pregnancy and labour, and of the infant's neonatal state.

Doctors should give thought to the way in which parents are informed that their child has a serious and persisting congenital disorder, whether it is found at birth or later. The mother must feel that the doctor is with her against fate and not that the doctor *and* fate are against her. She must be allowed freedom of feeling. She may want to be angry; she may want to turn away from the world. If the doctor sympathizes, and suffers with her, he can help her to realize and go through these stages, instead of solving her problem by refusing to admit that there is anything wrong with the child. This last solution produces the parents who endlessly take their defective child to yet another hospital for yet another opinion. In deciding what to do, it is best to meet the immediate needs of the situation, for what will be suitable when the handicapped child is ten is not necessarily what is best for him or for his parents when he is still a little baby.

ILL HEALTH IN SENIOR OFFICERS

By HUGH L'ETANG, B.M., B.Ch.

In his 'Thoughts on War' Liddell Hart[1] quotes some words he wrote in May 1935:—

'If the body is either unwell or too active, it impinges on the mind. We ought to take account of this factor when weighing the mental form of commanders'.

Other military historians have paid surprisingly little attention to this factor, and it is noticeable that the few existing studies have been made by medical historians. The latter are experts in medical diagnosis but are less familiar with war, and they have concerned themselves with almost every century except the 20th. Kemble, for example, asserts that Napoleon's lethargy at Waterloo was due to adiposogenital dystrophy,[2] and a student of that other great battle of the 19th century, Gettysburg, states that Lee was in great pain and was very weak from an attack of dysentery on July 2, 1863.[3] At this distance of time, and in view of the limited facilities for investigation of that period, such diagnoses, though plausible, are speculative.

The student is on firmer ground when he considers ill health in senior officers in the present century, for advances in medicine have rendered diagnosis more precise, and frank discussion of illness is more common. A study of ill health in senior officers and its effect on their performance is long overdue, and the literature of the two World Wars provides much valuable evidence.

THE 1914-18 WAR

Liddell Hart has for long criticized a system 'which brought officers to high position at an age when their energy was declining, and their susceptibility to the strain of war increasing'.[4] The 1914-18 War furnished a number of examples in this category.

THE RETREAT FROM MONS, 1914

The commander-designate of the II Corps, General Grierson, collapsed and died on his way to France. On the night of August 25-26, 1914, the crucial period at Le Cateau, the Chief of Staff of the B.E.F., Sir Archibald Murray, exhausted by anxiety and overwork, collapsed from shock when a false report arrived that the enemy had attacked and defeated I Corps.[4, 5] Liddell Hart remarks, almost with regret, 'that he recovered sufficiently to think he was functioning normally, when he was still unfit', and adds some information about the Commander in Chief, Sir John French. This officer, who was aged 62, had a heart attack after the retreat and was advised to limit his activities, but did not give up his command for another year.

GALLIPOLI, 1915

The strategic possibilities of this campaign are still keenly debated, and the selection of commanders may be criticized as regards their age and state of health. The early operations were carried out by the Royal Navy, and

the whole scheme led to a clash at the Admiralty between Churchill, the First Lord, and Admiral Fisher (fig. 1), the First Sea Lord. Churchill had brought Fisher back to the Admiralty at the age of 73, and has described how the Admiral woke in the early hours of the morning to start the day's work and adds:—[6]

'As the afternoon approached, the formidable energy of the morning gradually declined, and with the shades of night the old Admiral's giant strength was often visibly exhausted'.[7]

Of Fisher's resignation, Churchill says:—

'I for my part have always adopted the hypothesis of a nervous breakdown . . . hysteria, not conspiracy, is the true explanation of his action'.

FIG. 1.—Bust of Admiral Fisher, by Epstein. (*By courtesy of the Imperial War Museum.*)

The preliminary bombardment of the Narrows had been begun by the fleet, under the command of Admiral Carden then aged 57. This officer was not the first choice, but had been taken from the post of Superintendent of Malta dockyard and had already spent a trying winter at sea. Under the increasing strain of operations, and pressure from the Admiralty, he complained of severe abdominal pain, and was unable to eat or to sleep at night. On March 15, 1915, he resigned on medical advice.[8, 9] Nor were some of the Army selections any happier. Lieut.-General Sir Frederick Stopford was aged 61 when he arrived in July 1915. From 1912 to 1914 he had been Lieutenant of the Tower of London, and his health had been affected by service in Ashanti in 1895. Major-General Hammersley, who commanded the 11th Division in the assault on Suvla on August 6 and 7, had had a breakdown in health a year or two before. On August 23, 1915, he was taken off the peninsula in a state of collapse.[8]

CHEMIN DES DAMES, 1917

Towards the end of 1916, General Nivelle promised the Anglo-French war leaders a complete break-through as the result of his new offensive. Many military leaders were opposed to his plan, but his attractive personality and powers of persuasion impressed the politicians. The offensive began on April 16, 1917, and between that date and April 25, 1917, the French Armies lost 15,000 killed, 60,000 wounded, and 20,000 missing. The promised success did not materialize, the morale of the French Army was affected, and mutiny broke out. It was observed before the offensive that Nivelle's reluctance to listen to contrary opinions and to warnings was

partly induced by his Chief of Staff, Colonel d'Alenson. This officer had tuberculosis, and knew he had not long to live. It was realized at the time that he wished to be the architect of a supreme gamble for victory. He died in June 1917, 'a Napoleon devoid of genius'.[5, 10, 11]

Perhaps a short digression may be permitted here, for tuberculosis was one of the links in the chain that led to the outbreak of war in 1914. Princip and two others were selected to murder the Archduke Ferdinand at Serajevo in 1914.[12] All three were 19 years old, and all had advanced tuberculosis. It is thought that, like d'Alenson, they felt it their duty to sacrifice what life they had left for the cause. It was Princip who fired the fatal shots and, by an odd coincidence, one of his victims, the Archduke, also had tuberculosis.[13]

FIG. 2.—General Georges.

THE 1939-45 WAR

Some twenty years after the end of the first world war, Adolf Hitler assumed command of the German Armed Forces. He deliberately provoked war in 1939, because he, too, believed that he had not long to live. Goering related at the Nuremburg trials that Hitler thought he had cancer of the stomach, and feared that he would not have time to fulfil his mission.[14] On an even greater number of occasions than in the 1914-18 War, critical situations were to be faced by officers who were not at the peak of mental and physical efficiency.

THE BATTLE OF FRANCE, 1940

In January 1940, General Gamelin the Commander-in-Chief, then aged 67, placed the allied forces in north-eastern France, including the British Expeditionary Force, under the operational control of General Georges (fig. 2). This officer was 65 years old, and had an eventful medical history. He had been wounded in 1914, and was off sick for two years. In 1934 he was wounded again in the hand and chest, when King Alexander of Yugoslavia and Barthou, the French Foreign Minister, were assassinated in Marseilles. He was again away for a long period.[15]

On May 10, 1940, Georges was confronted by a German Army using a technique of warfare which had been largely ignored by the Allies. By May 18 he was in a state of physical collapse, which Gamelin attributed to the wounds received at Marseilles, and from which he thought the victim had never sufficiently recovered.[16, 17] On May 19, General Weygand

arrived from the Middle East to replace Gamelin. Later that day he met Georges and his comment on the interview was:—

'I was painfully struck by the change in his appearance. He said to me, indeed, at once, that he could no longer sleep, and he did not hide from me his extreme fatigue.'[18]

Even at this late stage, a well coordinated counter-attack might still have delayed the German armoured thrust. Georges, however, remained in command, and his physical condition did not improve, for on June 14, 1940, he is described by Alanbrooke as being very tired and haggard.[19]

THE 'CRUSADER' OFFENSIVE, WESTERN DESERT, 1941

This was the first major offensive by the newly formed 8th Army and the first occasion in the war in which a large British armoured force engaged a German armoured force. High hopes had been raised in political and military circles, but by November 22 the situation was so confused that the 8th Army Commander, General Sir Alan Cunningham, wished to withdraw and regroup his forces. The Commander-in-Chief relieved Cunningham of his command, and ordered the 8th Army to stand and fight. Some interesting medical evidence has recently been revealed.[20] A month before the offensive, Cunningham was found to have defective vision in one eye. It was the type of defect that may sometimes be due to excess of tobacco, and it was suggested that he should stop smoking. He carried out these instructions, but the effect on the nervous system of a heavy smoker can well be imagined. Indeed, an eye-witness describes him as being tense and agitated just before the attack.

THE WITHDRAWAL IN BURMA, 1942

One senior officer, Sir John Smyth, is unique in that he describes his own medical state with remarkable objectivity, together with its adverse effect on his generalship.[21, 22] In June 1941, he was given command of the 36th Indian Infantry Brigade. About this time he had an attack of malaria, and an anal fissure. This latter condition was extremely painful, and later when an abscess developed an immediate operation was necessary. In October 1941 he was offered command of the 18th Indian Division. As this unit was just being formed, he accepted the command, for he felt confident that while the Division was undergoing its initial training there would be sufficient time in which he could regain his health.

Early in December 1941 he was given command of the 17th Indian Division. He had not really regained his fitness, but felt that he could hardly refuse the appointment. On December 28, 1941, when in conference with Wavell, an attack of influenza developed. Scarcely could he have recovered from this when, on January 16, 1942, his division was in contact with the Japanese. In any event, the battle would have presented a difficult problem but, presumably for reasons of prestige, he was ordered to keep his outnumbered troops dangerously far forward, instead of on ground of his own choosing. Early in February 1942 the Deputy Director of Medical Services

thought that Smyth looked strained and ill, and ordered the A.D.M.S. to convene a Medical Board. The members must have examined Smyth while the battle was in progress. After the war this A.D.M.S. wrote to Smyth:—

'We found nothing organically wrong, but I warned you that it was essential to have two months' rest at the first opportunity'.

Later on this officer contradicts his first sentence, for he says that Smyth had a recurrence of the anal condition, and that a fistula had occurred.

Smyth's desire to delay the Japanese at the Sittang river was denied him until it was too late, and when the bridge was blown on February 23, 1942,

FIG. 3.—Admiral Sir Dudley Pound (*Radio Times Hulton Picture Library*).

many members of his division were on the wrong side. Smyth had a complete physical and mental breakdown after this, and in due course was invalided from the Army. Having read his account, few could deny that his relatively trivial, but all too common complaints, must have been yet another burden, on an already overextended commander.

THE WAR AT SEA, 1939-43

On July 15, 1939, Sir Dudley Pound (fig. 3) became First Sea Lord at the age of 62. On the outbreak of war his responsibility became greater than that of the other two Chiefs of Staff, for not only was he the professional adviser to the War Cabinet, but he was also in operational command of the Royal Navy. His taciturnity, and the appearance he gave of dozing when matters unrelated to the Navy were under discussion, were considered to be rather engaging characteristics. As soon as Alanbrooke became Chief of the Imperial General Staff, however, he formed an unfavourable impression. On February 17, 1942, he recorded in his diary:—[19]

'Am getting more and more worried by old Dudley Pound as First Sea Lord. With him it is impossible for Chiefs of Staff to perform functions it should in the biggest Imperial war we are ever likely to be engaged in. He is asleep during 75% of the time he should be working'.

Perhaps continued contact blurred this shrewd clinical impression, and writing after the war, he recalls that it was on August 12, 1943, that they first noticed signs of serious failing. On a fishing trip during the Quadrant Conference in Quebec, Pound lost his balance and nearly fell into a ravine. They had difficulty in getting him into a car, and he seemed completely exhausted. Churchill has remarked on the subdued part Pound played at this conference, and has commented on a meeting with Roosevelt shortly afterwards in the early part of September 1943, in which Pound appeared to have lost his precision in answering questions.[23] Next day Pound resigned, telling Churchill that he had had a stroke and that his right side was largely paralysed. The paralysis grew worse, and he died on Trafalgar Day, 1943. He was found to have a cranial tumour, but whether this was the cause of the paralysis or whether there was an additional cerebro-vascular lesion is not certain. It is only natural to speculate over what period of time the cranial tumour may have been responsible for the fatigue and sleepiness which were even noticeable to lay observers.

OPERATION 'DRAGOON', SOUTH OF FRANCE, 1944

A number of the individuals mentioned were relatively old officers, confronted with serious crises in the early stages of a war. The next case to be considered is unusual in that it is a younger officer, aged 50, who had already enjoyed success in a victorious campaign.[24]

Rear-Admiral D. P. Moon of the U.S. Navy was the attack force commander on Utah Beach in Normandy on June 6, 1944. This operation had tired him considerably, but he was transferred to the Mediterranean for the landings in the south of France in August 1944, which were given the code name 'Dragoon'. He worried excessively over the details of the plan, and what he thought was the unpreparedness of his force. After a series of sleepless nights, he asked that the date of the landing be postponed. His superior, Admiral Hewitt, tried to reassure him, and suggested that they watch the rehearsal for the landing and consider any postponement after that. This appeared to satisfy Admiral Moon, but next morning he took his own life.

There is no doubt that extreme mental and physical stress can induce a profound depression. Spears has described a conversation with General Maistre in 1914.[5] This officer said that thinking all was lost during the retreat, he contemplated suicide. Later in the war, he achieved great distinction in the field, suggesting that this episode was a transitory phenomenon.

WHITEHALL-WASHINGTON, 1940-44

In 1940, General Sir John Dill (fig. 4) was transferred from the command of the I Corps in France to the War Office, becoming Chief of the Imperial General Staff on May 26, 1940. The country as a whole was cheerfully ignorant of the paucity of our forces and of the dangers we faced, and the next twelve months must have been a time of severe strain for informed

officers in positions of responsibility. In August 1941 the Director of Military Operations wrote:—[25]

'Dill was regarded by many as being completely worn out. They said his brain was anyhow not agile enough for his job, that he had no drive, and that he was always half asleep at meetings of the Defence Committee and of the Chiefs of Staff'.

On August 20, 1941, the same officer added:—

' Dill feels he should retire as C.I.G.S. at Christmas, since he would be 60 on December 25, 1941'.

Early in 1942 Dill was appointed to the Combined Chiefs of Staff in Washington. For the rest of his life he rendered valuable service, partly due to the high regard in which he was held by General Marshall, the American Chief of Staff. At the Trident Conference in Washington in May 1943 it was noticed that he had an infection. He had recently had an operation for the repair of a hernia, and had heavy night sweats.[19] This was followed by an obscure anæmia and by May 1944 it was observed that Dill was showing signs of age and was tired.[26] In July he had to go to hospital, presumably for the investigation and treatment of the anæmia. Describing the Octagon Conference in Quebec in September 1944, Alanbrooke, who seems to have developed into an excellent clinical observer, wrote:—[26]

FIG. 4.—General Sir John Dill.

'I did however notice at this Conference that he [Dill] was very far from being his old self. He seemed to be wasting away, and both mentally and physically he was showing signs of slowing up'.

Alanbrooke's description suggests a severe anæmia:—

'When walking down the passage of the hotel with him, one had continually to check one's pace. When speaking to him one had frequently to repeat sentences as if his brain only slowly absorbed statements'.

Shortly after this conference Dill died, on November 4, 1944. How long had Dill been suffering from anæmia? It might have been caused by the wound infection following hernia repair in 1943, but could have been present in chronic form for some time before this, and would certainly account for the tiredness and lack of drive for which he was criticized.

CONCLUSIONS

Ill health in senior officers is a sadly neglected problem. It is regrettable that this should be so, for it is generally recognized in civil life that all, from the senior executive to the humblest workman, must be mentally and

physically fit for the proper performance of their duties. Admittedly it is a difficult problem, since these officers are unlikely to complain of ill health, and some may be unaware of their disabilities. All would be reluctant to retire prematurely from their high appointments, secured after long years of service and keen competition. In addition, death at the desk earns a measure of the regard that is invariably accorded to death in battle. Such apparently heroic conduct must be sternly discouraged in senior officers. Illness may impair their mental and physical faculties, and resultant errors of judgment or indecision may prolong the course of a war and increase casualties.

Unfortunately, no certain remedy is at hand. Routine medical examinations have been found wanting, since they are not delicate enough to detect slight deterioration in fitness. Indeed they may be a disadvantage, for they may lead to the exclusion of officers who have a slight change in blood pressure, or abnormality in their urine, for example, but whose mental powers are unimpaired. Nor is the rigid application of an age limit satisfactory, for the exact period when mental and physical qualities begin to fail is not known with any certainty, and is subject to individual variation. Such measurements as there are, are related to civilian life, and take no account of the excessive demands made by war.

One thing is certain. The health of this select group of officers should be guarded with that almost over-anxious care that at the moment is reserved for prime ministers, presidents and pilots.

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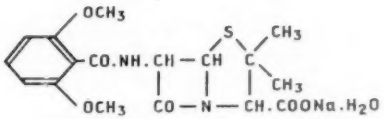
CURRENT THERAPEUTICS

CLX.—METHICILLIN

By A. H. DOUTHWAITE, M.D., F.R.C.P.
Consulting Physician Emeritus to Guy's Hospital

In *The Practitioner* of June 1960 (Douthwaite, 1960) an account was given of the research work which led to the isolation of the penicillin nucleus, thus opening the door to the production of a great variety of partially synthetic penicillins of different therapeutic possibilities. The oral penicillin, phenethicillin, which has replaced injectable benzylpenicillin in many conditions was fully described and its therapeutic value has already been accepted. In that article it was foreshadowed that a penicillin capable of destroying the resistant staphylococcus would shortly be available. This has come to pass in the production of methicillin ('celbenin'). It is sodium 6-(2,6-dimethoxybenzamido)penicillanate monohydrate whose structural formula is:—



PHYSICAL CHARACTERS

Methicillin is a white crystalline odourless powder, freely soluble in water giving a neutral solution. It is unstable in acid solution and is therefore unsuitable for oral use. The dry powder is stable. In neutral solution it loses 50 per cent. of its activity in five days at room temperature but only 20 per cent. at 5° C. Frozen solutions are stable for several weeks.

PHARMACOLOGY

Methicillin is bactericidal to many pyogenic organisms but its chief value lies in its ability to deal with the penicillin-resistant staphylococcus. This is of outstanding importance since there is no alternative antibiotic that approaches it in effectiveness and of such low toxicity. Although one or two strains of naturally occurring staphylococci have been found that are resistant to methicillin the chief interest in these strains lies not in the fact that they exist but the infrequency with which they are encountered; in fact, some 10,000 or more strains have been screened and not more than five isolates out of the whole of these 10,000 were found to be resistant to methicillin. If one considers that with the introduction of benzylpenicillin, some 6 per cent. of staphylococci were resistant to it, the likelihood of methicillin selecting out resistant strains must be extremely small and

methicillin-resistant staphylococci will certainly not be a problem for many years.

On the other hand, since the introduction of penicillin into hospital use in 1944, the number of strains of staphylococci which could be destroyed by penicillin has fallen from about 90 per cent. to under 20 per cent. The staphylococcus is resistant to benzylpenicillin by virtue of its ability to produce an enzyme, penicillinase, that destroys penicillin before the antibiotic can destroy the organisms. Strains having this power steadily multi-

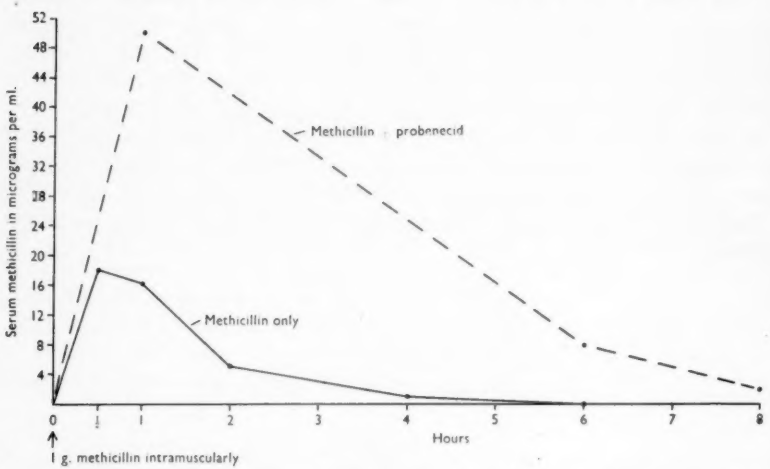


FIG. 1.—The effect of probenecid (1 gramme) given at the same time as methicillin (1 gramme) by injection, in enhancing serum levels obtained over an eight-hour period.

plied as the penicillin-sensitive organisms were destroyed and, after some ten years, the multiplication of these penicillin-resistant staphylococci, notably of the highly virulent phage-type 80, has produced the present-day dangerous situation, especially in hospitals where the organisms lingered in the air, on the clothing, on the skin and in the nose. Any patient admitted to a contaminated ward is therefore exposed to great hazards, especially if subjected to surgery.

Methicillin does not interfere with the production of penicillinase but it is both stable and active in the presence of penicillinase and is not destroyed by it. In fact, in the presence of methicillin (as in the presence of benzylpenicillin) staphylococci produce more penicillinase; both methicillin and benzylpenicillin are said to be inducers of penicillinase, but the difference lies in the fact that this penicillinase will destroy benzylpenicillin but will not destroy methicillin.

Many attempts have been made to produce methicillin-resistant strains of staphylococci *in vitro* and the results obtained have varied with different workers. It has been shown that methicillin-resistant strains can be pro-

duced *in vitro* in the same way as benzylpenicillin-resistant strains can be produced by growing the sensitive staphylococcus *in vitro*, but it is more difficult to produce a methicillin-resistant *Staphylococcus aureus* by training these organisms in methicillin than it is to produce benzylpenicillin-resistant staphylococci by training a sensitive staphylococcus *in vitro*. These *in vitro* findings, however, have never been shown to be of any significance in clinical practice, and there is no evidence to show that staphylococci can develop resistance to benzylpenicillin *in vivo*.

Absorption and excretion.—Methicillin is readily absorbed after injection and is excreted to a large extent in the urine in a similar manner to that of benzylpenicillin. Some 60 per cent. of a given dose appears in the urine within six hours. The remainder is excreted in the bile and eliminated in the fæces.

The serum concentrations are of primary importance, for the minimum inhibitory concentration of methicillin to all staphylococci is in the region of 1.25 to 2.5 mcg./ml. and obviously serum concentrations in excess of this are necessary for treatment purposes. Serum concentrations obtained after the administration of 1 gramme of methicillin intramuscularly (fig. 1) are fully adequate for the treatment of resistant staphylococcal infections; the level at half-an-hour is in the region of 18 to 21 mcg./ml., at one hour in the region of 10 mcg./ml., falling gradually to 1.5 to 2.7 mcg./ml. at three hours and about 2 mcg./ml. at four hours and undetectable levels at six hours. At four hours there is sufficient methicillin present to have a bacteriostatic effect as opposed to a bactericidal effect on the staphylococcus.

We know from our experience with benzylpenicillin that it is unnecessary to keep up the continuous blood level, for it is well recognized that effective control by antibiotics extends well beyond the theoretical minimal blood concentrations at the various times.

DOSAGE

The drug should be given slowly by deep intramuscular injection. Each vial contains 1 gramme of methicillin and the addition of 1.5 ml. of Water for Injection B.P. gives a total volume of solution of 2 ml. (500 mg. of methicillin per ml.).

Adults.—The recommended dosage is 750 mg. to 1 gramme four- to six-hourly, depending upon the severity of the infection. For general purposes 1 gramme may be given four-hourly for the first two or three days followed by 1 gramme six-hourly when evidence of response to the treatment is obtained. On the whole, treatment should be given for at least five days.

Children.—100 mg./kg./day divided into four equal six-hourly doses should be given by the intramuscular route.

Intravenous use.—From time to time, methicillin has been given by intravenous injection when immediate high levels of the antibiotic are required in order to save life or when muscle wasting is so marked that intramuscular administration is not feasible. There are no special precautions needed,

provided that the drug is given strictly intravenously: 1 gramme of methicillin should be made up to about 5 ml. with Water for Injection B.P. The object of this is to avoid the possibility of a solution of high osmotic pressure producing a venous thrombosis.

Intrathecal use.—3 to 5 mg. of methicillin may be given intrathecally daily if required.

Methicillin and probenecid.—To augment and prolong the blood levels of benzylpenicillin, probenecid has been used for many years to block its excretion. Stevenson and Harrison (1960) have now reported that this action is also exerted on methicillin. They found that if probenecid were given in a dosage of 1 gramme an hour before each injection, then the methicillin blood level was in the region of 32 to 64 mcg./ml. one hour after the injection and as much as 4 to 16 mcg./ml. at eight hours. This is a most important observation, which is well illustrated in figure 1, and suggests that it is possible appreciably to lengthen the intervals between methicillin administration. This is of undoubted use for prolonged treatment such as in bacterial endocarditis or for the treatment of an exacerbation of chronic osteomyelitis.

THERAPEUTICS

Methicillin is undoubtedly the penicillin of choice for the treatment of all patients suffering from infections due to penicillin-resistant staphylococci. This naturally covers a wide field. Reports on staphylococcal pneumonia, empyema, wound sepsis, perinephric abscess, cerebral abscess, pyogenic skin conditions, osteomyelitis and many others are notable for the fact that in no case did methicillin fail. Such uniformly satisfactory results are quite outside our previous experience and raise the hopes that a most serious menace to health, and indeed life, has been overcome. It remains to be seen whether, by some means more devious than the production of penicillinase, the staphylococcus will once again become a formidable foe. Considering the uniformly satisfactory results obtained with methicillin, it is advisable to use this drug first rather than other antibiotics that are not so satisfactory and by their use allow the patient to lose ground before finally methicillin treatment has to be instituted.

Bacterial endocarditis is notoriously resistant to eradication. If the condition is due to a resistant staphylococcus—a rare event—methicillin should be given for at least five weeks. It is in such chronic cases that the use of probenecid is particularly indicated, to allow reduction in the number of daily injections. As mentioned earlier, a dose of 1 gramme of probenecid every twelve hours may be combined with 1 gramme of methicillin every eight hours. The frequency and size of the dose must be determined by progress. The essential aim is to maintain a normal temperature.

In patients suffering from staphylococcal disease of the central nervous system, methicillin has been shown to pass the blood-brain barrier when inflamed meninges are present but no detectable methicillin is found in the cerebrospinal fluid in conditions not affecting the blood-brain barrier.

Is it possible to use methicillin prophylactically as well as therapeutically? In some thoracic units it is given for three days: 1 gramme before operation, and repeated eight-hourly for three days following operation in order to eliminate the possibility of resistant staphylococcal infection.

It is important to appreciate that the advent of methicillin has not reduced the necessity for surgical drainage, but the timing of surgical intervention may have to be considerably modified. Thus, in staphylococcal empyema, with hectic temperature, profuse sweats and rising pulse rate, the patient may be restored to comparatively good health by the use of methicillin. The constitutional disturbance subsides and the leucocytosis recedes; when this occurs is the time to evacuate the pus. In point of fact, in such cases, it is not unusual to find that the pus in the meantime has become sterile. In the early stages of pus formation due to the resistant staphylococcus it may be possible to secure complete recovery with resolution by the use of methicillin alone.

This is well shown in the case of a man, whose pyrexia followed a boil on the wrist. He developed leucocytosis, pain, sweating and acute tenderness in the loin presenting a picture characteristic of perinephric abscess. He made a complete recovery within one week of treatment with methicillin.

Staphylococcal sepsis shut away in thick-walled abscesses or in bone, e.g. osteomyelitis, cannot be expected to be permanently overcome by any drug given parenterally, although very satsifactory results have been reported in acute exacerbations of chronic osteomyelitis when the blood supply to the affected part is considered to be reasonably satisfactory.

The conversion of a toxic patient to one who feels well but who harbours an abscess must be our aim. The risk of surgery is then reduced to negligible proportions. Such cases should be given methicillin for at least five days following the operation. Local instillation of methicillin into abscess cavities which fail to close following surgical drainage is again of value. This has proved curative in chronic empyema.

CONTROL OF CROSS-INFECTION

Cross-infection in hospitals is at the present day a major problem and the work of Elek and Fleming (1960) has shown that methicillin may play a part in eliminating it. The present position is put succinctly by these authors:—

'While the treatment of cases is an important aspect the fundamental requirement is to interfere effectively with the epidemiological cycle. Rigorous aseptic surgical technique can keep wound infection to a low level but does not eradicate it. Moreover, it cannot be applied to the prevention of such forms of cross-infection as staphylococcal broncho-pneumonia in elderly and debilitated patients. Other things being equal, the greater the pollution of the environment by staphylococci, the more readily will wounds and weakened epithelial surfaces become infected. High nasal-carriage rates in normal people, combined with the confined conditions in a hospital, lead to a build-up of staphylococci in the surroundings; the noses of fresh individuals then become colonized in their turn and void more staphylococci into the air and dust. This is the fundamental cycle, the patient being but an accident within it; but once sepsis has become established it also contributes staphylococci to the pool'.

Elek and Fleming believe that the nasal carrier lies at the root of the problem and that spraying the atmosphere with methicillin is effective against all strains of pyogenic staphylococci and possesses all the desirable properties that an antibiotic should have if it is to be used for this purpose. The spray of methicillin produces droplet nuclei which follow the same passage as the staphylococci.

Certainly the results of spraying a ward with 1 gramme of methicillin in 20 ml. of distilled water four times daily were dramatic in the reduction of staphylococci in patients, carriers, and in the dust. There are some who fear that such a method will ultimately lead to the emergence of resistant strains as did the wholesale use of penicillin in the past and, they quite rightly have sounded a note of caution. On the other hand, it is also argued that methicillin being quite impervious to penicillinase cannot select out resistant strains as staphylococci have no other available means of self-defence. Only time will show which of the views is the correct one. We are entering an era when many accepted views about penicillins are now being questioned and ultimately with our better understanding of such problems a closer cooperation will be found between bacteriologist and clinician.

TOXICITY AND SIDE-EFFECTS

Extensive acute and chronic toxicity tests in animals have shown methicillin to be virtually non-toxic; in fact, it is slightly less toxic than benzylpenicillin. As patients who are sensitive to penicillin may show allergic reactions when given methicillin, it should only be given with caution to known penicillin-sensitive subjects.

In one patient treated surgically and also with methicillin for an extradural abscess, vomiting and pyrexia developed. This could not be explained on the basis of the local condition. Methicillin was then withdrawn and the symptoms subsided only to recur some forty-eight hours later when methicillin was readministered. It seemed logical to conclude that methicillin was the cause of the pyrexia in this case.

If given slowly by deep intramuscular injection, methicillin is said to be no more painful than injections of benzylpenicillin. Should the patient complain of pain this can be avoided by injecting 0.5 ml. of 1 per cent. lignocaine intramuscularly. The needle is left in place for the subsequent injection of methicillin.

CONCLUSION

It can be claimed that the characterization and isolation of 6-amino-penicillanic acid and the synthesis of the first two penicillins by this route, namely phenethicillin and methicillin, have provided the greatest advance in therapeutics since the discovery of penicillin.

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CALLING THE LABORATORY

XVI.—BLOOD CULTURE

By J. M. ALSTON, M.D., F.R.C.P.Ed.
Consultant Pathologist, Archway Group of Hospitals, London

Bacteriological culture of blood is necessary for the diagnosis and treatment of several infections.

INDICATIONS

In general, it is a part of the investigation of any severe febrile illness if the diagnosis has not been readily revealed by clinical examination or by laboratory tests of excretions, body fluids, or tissues. In addition, even when a diagnosis has been confidently made by clinical methods alone, blood culture may be a useful means of detecting the differentiating features of the infective organism for epidemiological purposes or for finding the antibiotic drugs to which the patient's strain of organism is most sensitive. Examples of epidemiological problems are the tracing of enteric bacteria to their source from other persons or from infected food or water, and the tracking of the origin and pathway of staphylococcal infection between patients, staff and inanimate objects in the wards of hospitals.

If certain infections are suspected, blood culture should be made as soon as the suspicion arises. These diseases include the *enteric fevers*, because blood culture is the best laboratory test during the first week of illness, before antibodies develop in the serum. The case is similar when *leptospiral disease* is suspected, although inoculation of a guinea-pig with the patient's blood is an alternative to culture in medium. When *brucellosis*, in the form of abortus fever or Malta fever, is suspected, blood culture should be made as early as possible and continued or repeated during relapses in order to find the most hopeful antibiotic drugs in different stages of this disease, which is very prone to relapses. If *chronic meningococcal septicæmia* is suspected blood culture is often the only means of confirming the diagnosis.

In many more instances, blood culture is needed to identify bacteria, usually pyogenic organisms, which reach the blood stream from sources which cannot be detected or have not been reached. The best example is *bacterial endocarditis;* when this is suspected blood culture should, if possible, be done twice daily for two or three days before treatment is begun, since it is important to isolate and keep the infecting strain so that drug-sensitivity tests for immediate and later treatment can be guided. In long-lasting cases of this form of endocarditis successive blood culture may be needed because the infecting organism may become resistant to drugs to which it was at first sensitive. In many instances, *septicæmia* arising from *abscesses* in various sites, from *pericarditis* or even from *pneumonia*, *pleurisy* or *meningitis* may first be detected by blood culture.

MATERIAL AND INFORMATION REQUIRED

The clinician should obtain from the laboratory culture medium and a 5-ml. or 10-ml. syringe sterilized by dry heat. In doing this one or more types of suitable medium can be obtained according to the kind of bacteria considered likely to be present and *p*-aminobenzoic acid or penicillinase can be added to the medium in the laboratory if the patient has recently been treated with a sulphonamide drug or with penicillin. It is sometimes possible to make good cultures in the laboratory from clotted blood taken, for example, for serological tests but as a rule injection of the blood into medium at the bedside is much preferable. The fluid medium is usually in 50-ml. or 100-ml. quantity and to this 5 or 10 ml. of the patient's blood should be added respectively. At the bedside the procedure is as follows:—

Remove the 'viscap' covering on the cap of the bottle of medium with a sterile knife and cover the perforated metal exposed, with a sterile swab. Prepare the patient's skin over a suitable vein by washing with soap and water, swabbing with iodine and covering with a sterile swab. Apply a tourniquet, unwrap the sterile syringe and draw 5 (or 10) ml. of blood. Remove the swab from the top of the bottle of medium, push the needle (which is still attached to the syringe) through the rubber diaphragm below the hole in the metal cap and inject the blood into the medium; mix the blood and the medium by shaking.

Give the laboratory a brief outline of the illness, with its duration, and name any bacterial causes that are suspected. State if any specific treatment, especially antibiotic, has been given before the culture was made. Ask for sensitivity tests to antibiotics, naming the drugs, if you wish.

LABORATORY PROCEDURE

In the choice of medium already made, account has been taken of likely organisms, and incubation of the medium at 37°C. will be made aerobically, anaerobically or otherwise, as required. The fluid culture will be examined by film and subculture will be made on solid medium after eighteen hours, and later up to seven days or longer. Colonies will be examined and identified by means which often include serological tests and identification of the type of enteric organism or staphylococcus by its reaction to bacteriophage. The sensitivity of the organism to a series of single antibiotic drugs may be done; in the case of long-lasting and dangerous infections—such as subacute bacterial endocarditis due to non-hæmolytic streptococci—tests of the sensitivity of the organism to pairs of the possible drugs may also be useful.

SUMMARY

The value of a blood culture depends a great deal upon care to avoid contamination, when the blood is taken from the patient's vein and injected into the culture medium. The growth of extraneous organisms from the skin or unsterile instruments may be confusing, because they are not always recognizable as obvious contaminants and they may overgrow and obscure bacteria actually taken from the blood stream. If a negative or an uncertain result is obtained culture should be repeated at least once as bacteria enter the blood stream irregularly from some foci of infection.

PRINCIPLES OF REHABILITATION

IV.—ASSESSMENT

By W. RUSSELL GRANT, M.R.C.S., L.R.C.P., D.Phys.Med.
Director, Department of Physical Medicine, Royal Hampshire County Hospital, Winchester, and Winchester Group Agricultural Rehabilitation Unit.

Very often a patient is not afforded maximum opportunity for rehabilitation on account of the following factors: (i) A clear-cut picture of the resultant loss of function and independence is not borne in mind when assessing the situation. (ii) The aims and objects for the patient are not clearly worked out and planned. (iii) Even if (i) and (ii) are satisfied, then there may be lacking the essential knowledge as to how they may be achieved in the most efficient and economical way. Even when this knowledge is present, full efficiency may not be obtained through there not being continual attention to detail throughout the course of rehabilitation.

THE OBJECT OF REHABILITATION

The object of rehabilitation is to return the patient to as normal a life as possible by restoring function and thereby independence. At this stage we are no longer concerned so much with what was the cause of the disability but rather what loss of function has the individual sustained as a result. When dealing with such cases it is essential to have one's own particular scheme always in mind so that essential details do not become overlooked. The scheme I wish particularly to outline is not put forward as by any means the ideal one, but it may serve as a scheme upon which others can be built. For convenience I have divided independence into three broad headings: (i) personal, (ii) domestic, (iii) financial.

(i) *Personal independence.*—A completely helpless bedfast patient will require more or less continuous care and supervision. To obtain independence in this category every opportunity must be sought to enable the patient to attend to feeding and toilet, washing and dressing, and getting from bed to chair, chair to toilet and vice versa. If this stage can be achieved, then not only is it of considerable value to morale, but it at once helps the household by moving the patient from the category which requires complete supervision. For example, the patient can be left at home while the housewife goes out to do the shopping, or in some cases where the other member of the household is the breadwinner, bread-winning occupations can be continued.

(ii) *Domestic independence.*—This should aim at the patient having become fully independent in personal activities; getting to the stage now when he or she can contribute positively in the running of the home: for example, by cleaning, washing-up, answering the telephone or the door, baby-sitting.

(iii) *Financial independence.*—In the case of the wage-earner, this is achieved when the patient is once more able to go back into gainful employment. In the case of the housewife it will be when she is fully able to carry out those normal very numerous duties which fall to her lot.

AIDS TO INDEPENDENCE

In considering restoration of independence, one naturally will restore function as much as possible, but having built the patient up, there ay well be certain functions still incomplete and, when possible, these functions should be restored by, so to speak, building up the 'patient's surroundings'. By this I mean adapting place of work or house, so as to restore maximum effective function. If certain things are needed we must then know from whence they can be supplied, and how to put the necessary machinery in motion. This is conveniently considered under the following headings: (i) aids to personal independence, (ii) aids to mobility, (iii) aids to domestic independence, (iv) aids to financial independence, (v) modifications to the house and/or at place of work.

(i) *Aids to personal independence.*—This will, of course, involve aids already mentioned, such as feeding, toilet, dressing, washing, mobility, and will be dealt with in a subsequent article.

(ii) *Aids to personal mobility.*—These will involve the wheel-chair, walking-aids, and instruments which may well include spinal braces, calipers, toe-raising springs, corsets, and the like.

(iii) *Aids to domestic independence.*—These will be dealt with in a later article but briefly they are covered under the heading of adaptations to brooms, brushes, dustpans, vacuum cleaners, positioning of kitchen ware, and the like.

(iv) *Aids to financial independence.*—At this stage this will consist of the provision of means of getting to work. It may involve the provision of a tricycle and its accommodation.

(v) *Modifications to the house and/or place of work.*—These may consist of such things as putting up an extra rail on the staircase or a ramp up or down one step, but often involves seeing that the living-room, bedroom and toilet are all on the same level. So far as the place of work is concerned, the modifications are required to facilitate operating machinery, according to the type of work and residual disability. It is worthwhile mentioning here how often it is easy to adapt the ordinary prefabricated single-storied building for heavily handicapped people.

WAYS AND MEANS

Having gone through this list, probably one, two or only a few items at the most will be required in each individual case. One must then consider the ways of supply and the hospital will form a convenient starting point. Here the patient can be supplied under the National Health Service with instruments such as toe-raising springs, calipers, spinal braces, and the like,

	Comment	By Whom	Requested	Hastened	Received
Personal Toilet					
Dressing					
Feeding					
Bath					
Mobility					
Aids Chair					
Walking-aids					
Instruments					
Brace					
Corsets					
Domestic Cooking					
Washing-up					
Cleaning					
Bedmaking					
Laundry					
Financial Motor chair					
Employment					
House Bedroom					
Living					
Kitchen					
Toilet					
Bath					
Access					

Disability ..... Jobs .....

Age..... Next of Kin.....

NAME:..... ADDRESS:.....

Under the 'Comment' column are noted what aid, gadget, housing modification or the like may be required. In the next column is noted from whom they should be obtained, and subsequent columns refer to the dates and are self-explanatory.

Table I.—Assessment card for dealing with disabled patients.

and where there is an up-to-date occupational therapy department many useful objects, simple adaptations, and gadgets for use at home can also be supplied, and, of course, in many hospitals there is an active and exceedingly useful League of Friends.

Leaving facilities provided by the hospital, we must now consider the statutory and voluntary services. Statutory services are under the county council and consist of the supply of nursing aids and welfare facilities. Many of these services are at present permissive, except in the case of tuberculosis, but with a cooperative county medical officer and welfare officer, can be very helpful indeed. The voluntary societies consist of the British Red Cross and St. John Ambulance and local charities whose good works are far too well known to be reiterated here. In addition to these, there is a number of nationally organized voluntary services which usually come under the heading of the name of the disease which they support and from whom help can sometimes be obtained.

All these various points can conveniently be included on an assessment card, such as that shown in table I, and which is the one in use in this department.

REVISION CORNER

HALLUX VALGUS

HALLUX valgus, or popularly 'bunions', is well known to everybody as a common and particularly disabling condition of the feet. In fact it is the commonest of all foot deformities and is probably responsible for the greatest number of admissions to orthopædic hospitals today.

PATHOLOGY

The deformity consists of a medial deviation of the first metatarsal—metatarsal varus—with a lateral or valgus deviation of the toe phalanges at the metatarso-phalangeal joint. Varying degrees of deformity are encountered. Sometimes it is very mild but in extreme cases the phalanges of the big toe are so displaced that they lie almost transversely either over or under the other toes. There may also be a rotational deformity of the big toe so that the nail looks towards the other foot. The lateral displacement of the toe brings into prominence the head of the first metatarsal which is subjected to considerable pressure by footwear. In consequence an adventitious bursa or bunion develops, which often gives rise to severe pain and may be subject to attacks of inflammation.

The pathological anatomy appears to be a lateral displacement of the

fibrous plantar pad which encircles the sesamoid bones and into which are inserted the adductor hallucis, flexor hallucis brevis, and adductor transversus muscles. This pad, which is firmly attached to the base of the proximal phalanx, has a medial attachment to the metatarsal head which holds the pad in the central position. Stretching of this attachment allows the pad to move laterally thus pulling the toe unto the valgus position. By reason of the muscle attachments to the plantar pad, once the toe has begun to move into valgus the deformity is likely to be progressive as the lateral displacement of the toe is aggravated by the bow-stringing effect of the extensor hallucis longus tendon which is also displaced laterally. The disorganization of the fore part of the foot results in prominence of the metatarsal heads which become painful—metatarsalgia.

CAUSATION

The enigma is what causes the toe to go into valgus, and this is still largely undetermined. The condition of congenital metatarsus varus with an adducted big toe is well known. Such a foot is liable to have the big toe forced over into the valgus position by footwear as the patient grows older. Many members of a family may have the deformity so that there would appear to be a hereditary influence. Women are affected mainly and constitute about 85 per cent. of those attending for orthopædic correction and for this reason it has been believed that it was the constricting effect of footwear with high heels and pointed toes which gave rise to symptoms, but this is not entirely true. Although great attention has been directed towards children's footwear for many years it is a fact that hallux valgus develops more commonly in girls than in boys and starts in the age-period 10 to 15 years. At this stage it is, of course, symptomless and it is only later when the bunion is well developed that the patient seeks advice and help. What brings about the deformity in early adolescence is subject to speculation, but it might be said that the tendency for teenagers to wear fancy shoes of the 'winkle-picker' variety could be responsible. What has never been explained is the reason for the development of hallux valgus in races who have always been barefooted and never been exposed to the constricting effect of footwear: e.g. the Africans in whom it is common.

Nevertheless, the big toe is an unstable structure and if the medial ligament of the plantar pad is stretched and the toe is pushed off balance, as it must be by the extreme fashion of pointed toes and high heels prevailing today, it can be confidently predicted that the present vogue will lead to a large crop of bunions in the years to come.

CLINICAL FEATURES

The patient usually seeks advice because of the prominence of the bunion which causes pain and which is often the site of acute inflammation. Painful corns and callosities occurring in association with the second and other toes may also require attention. The splaying of the foot with resultant prominence of the metatarsal heads may lead to metatarsalgia.

Osteoarthritic change in the deformed metatarso-phalangeal joint may also lead to severe pain in middle age.

TREATMENT IN TEENAGERS

It is essential to emphasize prophylaxis. As the condition starts in teenagers it is important that they should be provided with satisfactory footwear; tight socks and stockings should be avoided and, so far as possible, shoes should have a straight inner border and should not be constricting. Unfortunately, it is not always possible to alter the dictates of fashion. If, in spite of these precautions, the deformity increases the treatment in adolescence is problematical. Many surgeons are loath to operate on a valgus toe that is symptomless. If it were possible to obtain excellent results from early operation in most instances, there would be a strong case for surgical intervention in the well-developed case, but unhappily this is not so and many painful results follow. When symptoms are present, without doubt operation should be undertaken and ideally this should be of a reconstructive nature—an osteotomy of the first metatarsal to correct the metatarsus varus, and soft-tissue reconstruction of the metatarso-phalangeal joint—repair of the medial capsule and transfer of the adductor hallucis (McBride's operation).

TREATMENT IN ADULTS

In the adult the treatment depends upon the severity of the symptoms. Quite a considerable degree of deformity may exist without pain, and it is possible to keep a patient comfortable by careful selection of footwear. If metatarsalgia is present it may be relieved by supports. Operation should not be advised in the absence of pain merely to improve the appearance of the foot.

When pain exists with severe deformity treatment may be conservative or operative. The conservative approach is the provision of surgical shoes, but it should be remembered that these are always very unsightly, expensive and often ineffective in relieving symptoms. They should only be prescribed when patients refuse operation or operation is undesirable because of serious coexisting disease endangering life or the circulation of the feet.

If operation is undertaken, simple removal of the bunion and underlying knob of bone is unsatisfactory as further deterioration of deformity occurs. For many years now the operation of arthroplasty of the metatarso-phalangeal joint has been preferred and has stood the test of time. If improperly done or if the after-treatment is deficient a bad result follows and for this reason many people fear operation; but this is quite unfounded as most patients obtain a good result.

Two main types of operation are performed: the Keller operation, which removes the base of the proximal phalanx of the big toe and the prominent medial part of the metatarsal head; and the Mayo operation where part of the head of the metatarsal is removed. Of these two procedures the Keller operation is to be preferred as the weight-bearing area of the first metatarsal

head is preserved. The patient is usually able to return to full activity, which may include dancing, about eight weeks afterwards.

Arthrodesis has a few advocates, but sound bony ankylosis is not always achieved. Fixation of the bones by screws or clamps is necessary and the period of immobilization and inactivity is longer than that required by the Keller operation. If successful, its disadvantage is the inability of the patient to vary the height of the heel worn.

F. C. DURBIN, M.B., F.R.C.S.
Orthopædic Surgeon, Princess Elizabeth Orthopædic Hospital and Royal Devon and Exeter Hospital, Exeter.

TEETH-GRINDING

TEETH-GRINDING is a widespread human custom. Almost any conversational group will readily quote instances in the family circles. It is common among medical motorists in built-up areas. The American literature favours a word the Greeks had for it, ***bruxism***, which includes the habit of tight clenching of the teeth and also rhythmic tapping as well as forceful grinding. Closely akin to it are the habits of biting the lips and sucking in the lips or cheek-pads. As an expression of involuntary, wasteful and exhausting physical tension it is matched by the tapping of feet, drumming of fingers upon desks, hunching of shoulders and setting of the face in strained expressions which etch personality-lines upon some countenances.

Teeth-grinding may be considered as it occurs asleep and awake, in childhood and at responsible ages, in illness and in what otherwise passes for health.

DURING SLEEP

In children's sleep it attracts the attention of parents whenever the young are at an age to incur frequent inspection. Works of reference state gravely that it comes on in the second year of life, without stressing the correlation that it is at this age that the teeth come on too. The reported age-incidence is perhaps no more than a pointer to the amount of time parents devote to watching their sleeping offspring. The habit of switching on the light to do so is itself a provocative stimulus, likely to spoil any dreams which the child is enjoying. Diagnostic doubt may occasionally arise if parents suspect that a noise they have half heard in the night was an epileptic fit. A glance at the child should set fears at rest, by the absence of signs of struggle, exhaustion, sweating, froth on the lips or commotion of the bedclothes. The noise of a nocturnal fit, if clearly heard, is one of gurgling or choking in the throat rather than merely grinding the teeth.

The grinding of adult teeth in sleep is a cause of complaint by room-mate or spouse, and rarely by the individual affected. The disturbance may be as vexatious as snoring, though seldom so prolonged.

Teeth-grinding in coma is particularly intense in tuberculous meningitis,

with the fierceness of prolonged subconscious pain. The restlessness of other infective illnesses, whether delirious or not, may excite it to a less notable degree. Charles Darwin reported a hippopotamus in labour pains clattering her teeth together. Gum discomfort during the eruption of later primary teeth has been blamed for some cases. And the older writers suggested avoiding heavy evening meals which might cause digestive discomfort by overloading of the stomach. Teeth-grinding is not in any specific sense a sign of intestinal parasite infestation.

IN THE WAKING STATE

When awake, some normal children grind their teeth, as they may practise other rhythmic movements, from boredom. It is a feature of the unprofitable restless repetitive activity of many severely subnormal children. Taking the child population as a whole, however, teeth-grinding is not a problem to the school dental surgeon, but only an occasional curiosity. It is almost equally negligible in general adult dental practice in Britain.

In older subjects teeth-grinding needs to be considered with all the other irritable tricks of clamping the jaws, sucking in cheeks and biting lips and tongue, grimacing, hunching the shoulders and tapping the fingers and feet. The 'occlusal neuroses' should not be separated in consideration from all the other gestures of irritability, aggression or insecurity, to which many of us would at times confess. Chronic headache may arise from persistent unrecognized spasm of masticatory muscles.

THE EFFECTS OF TEETH-GRINDING

Those who commit excessive bruxism may suffer in two ways: attrition of their teeth or even of their dentures, and the more serious destructive damage to the periodontal tissues, which are not designed to resist continuous pressure or repeated impact out of meal-hours. Normally the mandible should be at physiological rest. If the periodontal breakdown is excessive the teeth may become loose as well as grooved or worn down. Excessive wear in any patient suggests a query as to whether the quality of tooth substance is defective or whether the mouth often contains abrasive substances, as in the case of a miner working in much dust, who ground his dentures to destruction.

TREATMENT

(a) The underlying cause of irritable tension should, if possible, be elicited and relieved, so that the habit of grinding the teeth may be discontinued.

(b) Dental appliances may, in severe cases, be designed, either to steady the wear of the teeth for the patient, or to enforce relaxation of masticatory muscles, or as night-guards to permit refreshing sleep for others sharing the bedroom.

CEDRIC C. HARVEY, M.D., M.R.C.P., F.R.C.S.ED.
Pædiatrician, Rotherham and Mexborough Hospitals, and West Riding County Council.

NOTES AND QUERIES

Undescended Testicles

QUERY.—I have a patient, aged 10 years, with bilateral undescended testes, not of the retractile type. They are not palpable.

(1) What is the optimum time to start hormone therapy, and what is the percentage of successes?

(2) If hormone therapy does not succeed, what is the latest age one should leave the boy before surgical attempt is made to bring them down?

(3) If the testes are left undescended or surgically it proves too difficult, what is the effect on the physical development of the boy, and what would be the effect on his sexual potency and fertility?

REPLY.—(1) The optimum time to start hormone therapy is between 8 and 10 years of age. The percentage of successes is small in cases in which both testicles are impalpable. Earlier figures are unreliable, due to the failure to recognize that retractile testicles are often difficult to feel in fat boys, but in a detailed series published by Brunet and his colleagues (*Brit. med. J.*, 1958, **i**, 1367), of 26 impalpable testes six came down as a result of hormone treatment.

(2) If hormone therapy fails after a three- or four-month trial, surgery should be undertaken forthwith.

(3) Most undescended testes contain normal interstitial cells and secondary sexual characteristics are therefore normally developed. Bilateral cryptorchids are usually potent, but it is very rare indeed for them to be fertile. Occasionally cryptorchidism is associated with testicular hypoplasia, in which case eunuchoid features may develop, and there is of course some danger of damaging the testicles by over-enthusiastic surgery.

D. INNES WILLIAMS, M.D., M.CHIR., F.R.C.S.

Steroid Treatment of Chronic Asthma

QUERY.—Could you let me know if and how steroids are being used for severe chronic asthma, and their degree of safety both orally and by inhalation? I am not referring to what is usually meant by status asthmaticus, as the patient I have in mind goes about his work; but I sometimes see him bent double in the struggle for breath and he is usually in a 'puffing and blowing' state.

REPLY.—The use of steroids in the treatment of chronic asthma is justifiable only when this is so severe as to disrupt the patient's normal way of life or, as in repeated attacks of status asthmaticus, is a hazard to life. A trial period of treatment for one to two weeks should be undertaken with the steroid of choice in the first instance. This is best carried out in hospital with careful clinical observation, records of simple respiratory function tests (such as vital capacity) before and during treatment and, ideally, comparison of the effects of steroid treatment with dummy tablets or a simple bronchodilator preparation. If a beneficial response can be demonstrated, and there are no contraindications, such as peptic ulcer, hypertension or quiescent pulmonary tuberculosis, steroids may be given in initial doses equivalent to prednisolone 30 mg.; the dose should be reduced over one to two weeks to 20 mg. and then more slowly by 2.5 mg. weekly to the lowest dose which maintains a satisfactory improvement. The lowest level is selected because the risk of side-effects is thereby diminished. Temporary increases may be required if the asthma deteriorates due to infection or contact with allergens in big doses (e.g. pollen during June/July). During infective episodes antibiotics should also be given.

Experience has shown that provided the dose is 15 mg. or less of prednisolone daily (or the equivalent dose of other steroid preparations) side-effects are likely to be few except for increase in weight which is often considerable, proportional to the dose of steroid given. A change to methylprednisolone or triamcinolone may be followed by a reduction in weight.

The main disadvantages of this form of treatment are:—(*a*) The difficulty in weaning the successfully treated patient, who is liable to severe relapse after treatment has been stopped even when this has been gradually carried out. For practical purposes most patients who have had steroid therapy for six months are likely to require treatment indefinitely.

(*b*) The patient's own suprarenal glands are suppressed and this leads to risk of circulatory collapse and death under conditions of stress when the body would normally increase its output of cortical steroids, as for example during and after anæsthesia. The administration of increased doses of steroid, up to 40 mg. of prednisolone daily over the period of operation, or of intravenous hydrocortisone in emergencies, will prevent this.

Patients on long-term steroid treatment should carry cards stating the preparation of steroid they are receiving, the date that treatment started and the dose. The urine should be tested regularly for albumin and sugar. Investigations for peptic ulcer should be under-

taken if there is any complaint of dyspepsia, or abdominal pain, and chest x-rays should be taken regularly if there is any possibility of an old tuberculous lesion becoming reactivated.

Aerosol preparations of hydrocortisone have been given successfully in short courses but there are no records of its continued use for long periods. It appears to be most successful in asthmatics who do not expectorate mucoid sputum. Its action is probably local.

Steroids are, of course, of no value in emphysema.

R. S. BRUCE PEARSON, D.M., F.R.C.P.

Anaphylactic Reaction to Chloramphenicol

QUERY (from a reader in Hong Kong).—Recently I have had three cases showing reactions to intramuscular injection of chloramphenicol. One complained of giddiness immediately after the injection; another complained of a fainting attack half-an-hour after the injection, and the third complained of urticaria which developed half-an-hour after the injection. To each of them I gave 250 mg. intramuscularly.

I should be grateful if you could kindly inform me whether these reactions are common and whether any fatal reaction is known.

REPLY.—The strong prejudice in favour of giving chloramphenicol by mouth among British doctors limits direct experience of injected preparations. Even so, it is unlikely that the reactions described are due to the drug itself and they have not occurred from the preparation when ingested. The attacks in the first two patients are probably of nervous origin. The urticaria could be due to contaminated solution with some allergen to which the patient was highly sensitive. Almost certainly the injection was associated with this attack.

The few fatal reactions reported as possibly due to chloramphenicol by any route have been disturbances of blood formation. Any other type has been rare and it is doubtful whether this drug gives any other reactions than those common to all broad-spectrum antibiotics due to changes in the flora and the replacement of normal organisms by unusual ones.

W. HOWARD HUGHES, M.D.

Venepuncture

QUERY.—Could you help me with the trouble I am still having with the technique of intravenous injections. (By the way, none of the experts in my area insert the needle with the bevel down, but always with the bevel up, in a single jab.) The difficulty is that when I press the left thumb on the vein distal to where I am going to insert the needle (with the right hand), the pressure of the thumb always renders the vein invisible for a distance of say an inch or two proximal to the thumb, as if it caused the vein to become empty. This happens even if I am using a sphygmomanometer as the tourniquet, with a pressure of 60 or 80 mm. Hg. I understand it is necessary to steady the vein with the left thumb, as I have described. In any case, it seems to me that the needle would have to come into contact with the left thumb if I try to insert it an inch or so proximal to the tip of that thumb.

I am also finding a short bevel a considerable disadvantage, but it is mainly the effect of the steadying left thumb obliterating or apparently obliterating the vein proximally that I am asking about.

REPLY.—(1) The vein is collapsing because too much pressure is being applied and thereby tightening the skin which in turn compresses the vein. It is not always necessary to steady the vein with the finger but in some people the veins tend to wrinkle around the point of the needle making venepuncture difficult. This is especially the case in old people or if the needle is blunt. On these occasions it helps to support the vein by tethering it distal to the venepuncture using pressure from the left hand. I would have thought that one inch was too close and would be bound to get in the way of the syringe. Where the pressure is applied is a matter of trial and error depending upon the site of the vein and the most comfortable position for the operator.

(2) Whether to insert the needle with bevel up or down is a matter of preference; the majority probably prefer bevel up as it is easier to pick up the vein with the point. The bevel down school say that one is less likely to pierce the walls of the vein (both walls) if the bevel is turned down.

(3) The short bevel needs practice to become used to if one is accustomed to a long bevel. The rationale of the short bevel is that one is less likely to place the bevel half in and half out of the vein, but it is always advisable to pass any needle well into the lumen of the vein, when injection into the tissues is less likely to occur.

CLIVE JOLLY, M.B., F.F.A.R.C.S.

Variola Minor

QUERY (from a reader in Central Africa).—In my duties in this area I have come across a number of cases of what appears to be smallpox but with minimal constitutional disturbances. The distribution and the cropping are typical of smallpox. The blisters seem to arise from the deeper layers of the skin, especially noticeable on the hands and feet, and are often almost

1 cm. across and raised considerably so that the impression is of a sphere cut across the middle. I have not observed the eventual result to see whether a permanent scar is left but it does not appear as though there will be a scar in those patients who are recovering. All cases have occurred in children from about 5 to 12 years of age.

(1) What danger is there of an outbreak of variola minor changing to the major form on passage from one child to another?

(2) Do you think from this description I should label this variola minor?

REPLY.—(1) There is no recorded instance to my knowledge of a change from the minor to the major type of illness during an outbreak.

(2) From the description given it would appear that your reader is dealing with variola minor, both types being common in the African Continent.

F. L. KER, O.B.E., T.D., M.B., CH.B.

Recurrent Anal Ulceration

QUERY.—I have a patient, 47 years old, who was a prisoner of war in Sumatra. He contracted malaria, dysentery and beri-beri while he was there, and ever since his return home he has suffered from recurrent ulceration and soreness of the anal skin. He has had full investigations at Roehampton, and his dysentery, for example, was considered cured. He has had large quantities of vitamin B.

I wonder if anything further can be done for him?

REPLY.—In the absence of positive parasitological and other laboratory findings, persistence of clinical manifestation of the kind here described is more likely to be due to a functional state than to an infection acquired in the tropics. The important steps are first to be sure that no tropical infection is present and this may be presumed in view of the full investigations carried out at Roehampton. Secondly, to ensure that there is no organic condition such as hæmorrhoids, fissure in ano or fistula in ano. If these conditions are fulfilled, reassurance and the application of compound benzocaine ointment B.P.C. might be tried.

PROFESSOR A. W. WOODRUFF, M.D., PH.D., F.R.C.P., D.T.M. & H.

Friedreich's Ataxia

QUERY.—I would be grateful for an opinion on the following case:—

One of my patients, aged 38, is suffering from Friedreich's ataxia. When she originally came under my care, in 1946, she was very frail and unable to do anything whatsoever. She had to be fed and most of the time refused food. I have encouraged the mother to give her a more complete diet and add to it vitamin B complex with ascorbic acid. She has also been encouraged to join a 'disabled club'. Through all these years, however, she has changed very little in her condition, until just recently when she started to show signs of improvement. She has been able to sit straight in her chair, as well as in the car, without being strapped; also she sits by the table and is capable of handling her food herself. Her brother, who suffered from the same disease, died in 1946 at the age of 21.

Is there any relationship between the vitamin intake and her improvement, or is this just a spontaneous recovery?

REPLY.—Although familial diseases of this type may well in fact be disorders of metabolism which could be corrected by some biochemical adjustment if we had any idea what the disorder was, there is no evidence that vitamins make any difference in this condition so far as I know.

The difficulty with this situation is that these patients become very demoralized with their disability and this is evident in this case from the report that the patient used to refuse her food. In this situation vigorous rehabilitation, raising of morale and encouragement, and a good diet will work wonders without bringing in any nutritional factor at all. The explanation of this improvement therefore remains a complete guess.

W. RITCHIE RUSSELL, C.B.E., M.D., F.R.C.P.

Impotence

QUERY.—Advice would be greatly appreciated on the following problem:—

An accountant, aged 31, suffers from 'last-second' impotence and has not achieved an ejaculation in intercourse since his marriage five years ago. Previously, during an engagement of several years, ejaculations were produced extravaginally with his fiancee's assistance. Before coming to this district he had been treated by a psychiatrist, and I have attempted reassurance, explanation and sedation, taking the view that if success can be achieved once only all will be well. He has been treated in the past two years for tuberculous abscesses, but the symptoms cannot be attributed to this condition.

REPLY.—The first thing to think of is the effect of drugs on ejaculation. Several of the newer drugs have been found to prevent ejaculation. The patient seems to be having treatment for his physical condition. If we eliminate this, then it appears that the reflex is normal enough, as we presume he had erection and ejaculation during the pre-marital period. The inhibition of

emission does occur even though penetration is achieved. In some cases it is due to a deep-seated concern about the loss of seminal fluid. It seems that the idea prevalent in India, that seminal fluid is life-giving and should not be lost, has reached this country. Deeper still, there may be a residual normal homosexual component that weakly reinforces an anti-heterosexual unconscious attitude. It is obvious that the condition is not a superficial one, such as was discussed in *The Practitioner* of February 1961 (p. 273). It looks as though it would be necessary for more intensive investigation, which is somewhat time-consuming.

The alternative, so far as marriage is concerned, is A.I.H., but this will not bring confidence back to the husband.

ALFRED TORRIE, M.B., D.P.M.

PRACTICAL NOTES

Chemotherapy of Multiple Myelomatosis

ALTHOUGH at present any treatment of myelomatosis is only palliative and therefore unsatisfactory, urethane, either alone or in conjunction with another agent, is the most effective form of chemotherapy in this condition, according to R. C. S. Pointon, of the Christie Hospital and Holt Radium Institute (*Clinical Radiology*, January 1961, **12**, 17), who compares the results of various workers with the diamidine compounds, urethane, the alkylating agents, and steroids. Multiple myelomatosis is usually fatal within two years of the onset of symptoms, although occasionally it may have a more prolonged course. Various of these compounds relieved bone pain but had no obvious effect on the disease process itself. Urethane has given relief of bone pain, improvement in anæmia and in some cases a fall in serum proteins and proteinuria, but even with this drug prolonged remission—such as occurred in one patient who responded dramatically to urethane and remained in remission for three years before relapsing and dying over four years after starting treatment—is rare. The usual initial dosage of urethane is 4 to 6 g., administered orally, either as a flavoured aqueous solution or as enteric-coated tablets, and the patient is then stabilized on a lower maintenance dose. Treatment is continued for as long as improvement is maintained or until toxic effects preclude further treatment. The drug was also found to have a synergistic action with some of the nitrogen mustard compounds. It is concluded that, as there is no statistical evidence that any of the agents at present available prolongs life, radiotherapy 'remains the principal method of palliation and chemotherapy should be reserved for the case where radiotherapy has failed to produce palliation'.

Treatment of Acute Alcoholism

EVIDENCE in favour of the value of intravenous tri-iodothyronine in the treatment of acute alcoholic intoxication is provided by M. Goldberg and his colleagues (*New England Journal of Medicine*, December 29, 1960, **263**, 1336), based upon their findings in 12 cases, aged 27 to 58 years, the majority of whom were chronic alcoholics. The solution for intravenous use was prepared from sodium tri-iodothyronine powder. Once dissolved in a solution of pH 10.5 and refrigerated, it will remain stable for five to seven days. The dose was 200 mcg. Following this, the rate of blood alcohol decline averaged 32.1 mg. per 100 ml. per hour, compared with 15.0 mg. per 100 ml. per hour among the controls. The great majority of the patients were 'relatively sober' within two hours of the injection, and the alcoholic odour in the breath had also disappeared within this period, compared with six to ten hours in the case of the controls. No side-effects were observed in any case. The *modus operandi* of tri-iodothyronine is not known, but it is suggested that the acceleration of alcohol metabolism is 'probably a direct effect on the hepatic enzyme systems that convert alcohol to acetaldehyde'. It is emphasized that the use of tri-iodothyronine is 'merely a useful adjunct to the presently available methods of treatment of acute alcoholism, such as parenteral infusion of fluids, vitamins and tranquillizers, and not a means unto itself'.

Recording Blood Pressure

FURTHER evidence of the extent to which the blood pressure is affected by the position of the arm at the time of recording is supplied by J. Merendino and F. A. Finnerty Jr. (*Journal of the American Medical Association*, January 7, 1961, **175**, 51). They report their findings in 104 consecutive patients (78 normotensive and 26 hypertensive), aged 14 to 63 years, in whom the arterial blood pressure was recorded with the arm in two positions (in both, the patient was sitting). In the first position the arm was resting on a table and level with the heart; in the second the arm was lowered approximately

60° from this position. In all but one of the patients the blood pressure was higher when the arm was in the dependent position; both systolic and diastolic pressures seemed equally affected, and the response was similar in the normotensive and hypertensive subjects. Lowering the forearm to below the level of the heart resulted in less than a 5% increase in mean arterial blood pressure in 14 patients, between 5 and 10% increase in 36 (33%), between 10 and 20% increase in 42 (40%), and greater than 20% increase in 11 patients. In eight patients, in whom the pressure was recorded directly from the brachial artery, there was a 26% average increase in mean arterial pressure in the dependent position. It is noted that, although this increase is not significant when the group is considered as a whole, in 39 of the patients the diastolic pressure increased from normal (under 90 mm. Hg) when the arm was level with the heart to 'hypertensive' (above 90 mm. Hg) when the arm was lowered.

Treatment of Hypopyon Ulcers

RESULTS with the use of gelatin discs containing penicillin and streptomycin in cases of hypopyon ulcers were compared with those in similar cases treated with these drugs by subconjunctival injection by A. D. Grover (*British Journal of Ophthalmology*, January 1961, **45**, 27). In a series of 32 patients, 17 were treated with the discs and 14 responded well. The average time for disappearance of the hypopyon was 3.61 days and for corneal staining 10.8 days, the mean visual acuity at the time of discharge being 3.8/60. Of the 15 patients treated by subconjunctival injection, 10 responded well but, although the average time for disappearance of the hypopyon was only 3.11 days, that for corneal staining was 11.66 days and the mean visual acuity at the time of discharge was only 3.33/60. In severe cases the response to the discs was satisfactory, but the injections failed, 'thus the over-all results with the disc treatment were slightly better'. The 30% solution of gelatin used to make the discs contained 20 g. of streptomycin and 20 mega units of penicillin in each 100 ml., and the discs were not spoiled by storage for seven to ten days. They were applied thrice daily by slipping them under the eyelids which were then bandaged. The injections consisted of 0.5 g. of streptomycin and 250,000 units of penicillin with a few drops of mydricaine and were given on alternate days. All patients were also treated with hot fomentations twice daily and 1% atropine ointment thrice daily. Another point in favour of the discs was that they were well tolerated 'even by acutely inflamed eyes' whereas, in spite of the mydricaine, the injections are painful—the greater the inflammation the greater the pain. The only difficulty with the discs was that in hot weather they tended to melt too quickly.

Diethylcarbamazine in Filariasis

'DIETHYLCARBAMAZINE in an effective dose acceptable to a population could unaided do much to eradicate bancroftian filariasis in West Africa. Mass treatment campaigns aimed at dosing all inhabitants at widely spaced intervals, e.g. 2 to 4 years, might in the long run prove to be the most effective and the most economical way of dealing with the infection in West Africa'. These are the conclusions reached by I. A. McGregor and H. M. Gilles (*Annals of Tropical Medicine and Parasitology*, December 1960, **54**, 415) as a result of their experience in two villages in Gambia. In all, a total of 87 patients received 2.5 mg. of diethylcarbamazine base per kg. of body weight on each of five successive days, 'care being taken to ensure that each person swallowed the dose'. The follow-up extended over 43 months. This dosage was well tolerated, and only three patients complained of side-effects: one of abdominal pain, one of headache, and one of small localized muscular swelling. Typical of the long-term results were those obtained in one of the villages. Three months after treatment, only 25.53% of the 47 subjects examined were found free of circulating microfilariæ of *W. bancrofti*, although the total microfilarial load had been reduced by 81.82%. At the 43rd month after treatment, however, in only 11.11% of 54 subjects could circulating microfilariæ be found, whilst the total microfilarial load of the group was found to have been reduced by 98.12%.

Corticosteroids and Pancreatitis in Childhood

SINCE the introduction of adrenal corticosteroid therapy, the incidence and severity of pancreatic lesions 'have seemed to increase and even to assume a primary role as the cause of death in some children', according to Ella H. Oppenheimer and J. K. Boitnott (*Bulletin of the Johns Hopkins Hospital*, December 1960, **107**, 297). In a study of necropsy findings in a group of 25 children with renal disease who had been treated with steroids the incidence of pancreatic lesions was found to be 40% (10 cases) compared with 14.8% (4 cases) in a similar group of 27 children who had not received steroid therapy. In a group of 25 children whose deaths were due to leukæmia, tumours or aplastic anæmia and who had received steroid treatment, the incidence of focal pancreatic lesions at necropsy was 16% (four cases), whereas no such lesions except

those due to direct tumour invasion were found in a similar group of 25 children who had not been treated with steroids.

Oral Carcinoma in Tobacco-Chewers

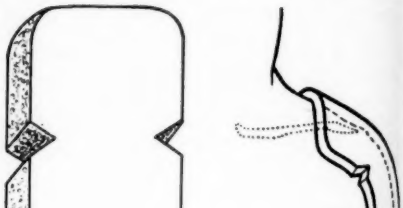
THE chewing of tobacco as a predisposing factor in the development of oral carcinoma is discussed by K. Sorger and J. A. Myrden (*Canadian Medical Association Journal*, December 31, 1960, **83**, 1413) who report four cases of verrucous carcinoma of the buccal mucosa in elderly men, all of whom had a longstanding history of tobacco-chewing. In all four cases the lesions were 'extremely extensive and strongly suggested the presence of massive carcinomatous infiltration, yet none showed clinical evidence of lymphadenopathy or of distant metastasis'. Although local invasion by such tumours is not uncommon, in three of the cases the lesion appeared to be confined to the surface and in two of these 'it was even possible to peel off much of the lesion at operation'. Treatment was by local excision of the oral tumour and 'it goes without saying that the habit of tobacco-chewing should be discontinued'. Although the lesions recurred locally in two of the cases there was no local or distant spread, and it is emphasized that 'verrucous lesions of the buccal mucosa of tobacco-chewers should be regarded as an entity which deserves to be separated from the more usual type of oral cancer on account of its relatively benign behaviour'.

Urinary Calculi in Africans

THE rarity of urinary calculi among the coloured African population is discussed by R. O. Wise and A. E. Kark (*South African Medical Journal*, January 21, 1961, **35**, 47). A survey of the records of all Africans admitted to the King Edward VII Hospital in Durban during a period of 8½ years revealed only 7 cases in 483,450 patients—an incidence of 0.0014%. This was in sharp contrast to the incidence among the Indian patients admitted during one year only —12 out of 9,600 (0.125%)—although predisposing factors to secondary urinary calculus formation, such as bilharziasis, long-standing chronic infection and urinary obstruction 'are equally common in Indian and African patients'. An interesting fact is that 'most recorded calculi in Africans have occurred in those originating north of the Union's Border, where calculi appear to be more common'. The reason for the low incidence is not known, but may be partly explained by the lower calcium intake and higher calcium excretion in the African 'who usually partakes of a high carbohydrate diet'.

Shoulder Injuries in Rugby Football

THE time has come to amend the laws of Rugby football to allow the wearing of shoulder pads for protection against shoulder injuries, according to T. C. J. O'Connell (*Journal of the Irish Medical Association*, February 1961, **48**, 46). Despite the fact that skilled players know how to fall, such injuries form a significant proportion of all injuries sustained in the sport, and the existing laws provide for the wearing of



such protection only after injury. Shoulder injuries usually require a longer convalescence than 'injuries in the neighbourhood of even larger joints', and 'even minor injuries to the shoulder "cuff" or to the ligaments of the acromio-clavicular joint are very liable to recur, sometimes in a more serious form'. Tests have shown that on impact with the ground the shoulder of a 14-stone (89 kg.) player travelling at a speed of 100 yards in twelve seconds meets a force equal to approximately three-quarters of a ton (760 kg.) through an area of about four square inches (26 sq.cm.). It has also been shown that by spreading the area of impact and increasing the duration of actual contact with the ground through the elasticity of covering structures serious shoulder injury can be avoided. The suggestion is therefore made that Law 5, which governs the players' dress, should be amended to allow such protection and 'there can be little doubt that it is necessary in the interest of the players and of the game generally not only to permit without restriction but to advise that players, especially backs, should wear a shoulder-protecting device of Sorbo-rubber'. This rubber has 'highly elastic qualities and can be so treated as to be waterproof'. A pad, 6 inches by 4 inches by ½-inch (15 x 10 x 1.25 cm.), shown in the accompanying figure, fashioned to cover the shoulder, provides excellent protection and, as is pointed out, can hardly be said to constitute a cause of injury to opposing players.

REVIEWS OF BOOKS

Recent Advances in Renal Disease. Edited by M. D. MILNE, M.D., F.R.C.P. London: Pitman Medical Publishing Co. Ltd., 1961. Pp. 254. Illustrated. Price 25*s*.

THE 'scientific conferences' organized by the Royal College of Physicians of London are now one of the highlights of the London medical year. This volume contains the proceedings of the fourth of these, held last July. Its claim to attention, like those of its predecessors, is threefold. In the first place it is published with commendable speed, and there is not the long delay which usually detracts considerably from the practical value of such 'proceedings'. In the second place the approach is predominantly clinical and not 'scientific' in the narrow sense of the term. Finally, the report is uncensored and verbatim, which lends an interest which is missing from many formalized reports.

The scope of the present volume is well indicated by the titles of the various sessions: 'Renal function and structure', 'Acute renal failure', 'The nephrotic syndrome', 'Pyelonephritis', 'Metabolic aspects of renal disease', and 'Hypertension and the kidney'. The chairmanship of these was shared by Professor R. A. McCance, Lord Evans, Sir Robert Platt, and Professor John McMichael. To many the most valuable part of the book will be the searching cross-examination to which the leading speakers were submitted in the various discussions, but, taken all in all, the volume provides an admirable review for the clinician of current views on the etiology and treatment of renal disease.

Modern Trends in Urology (Second Series). Edited by SIR ERIC RICHES, M.C., M.S., F.R.C.S. London: Butterworth & Co. (Publishers) Ltd., 1960. Pp. 300. Illustrated. Price 70*s*.

THIS is an excellent book. It does not in any way purport to cover the whole field of urology, but in a series of chapters the most recent advances in physiological and pathological knowledge and in lines of therapy are detailed and discussed. There are several fascinating chapters on disorders of metabolism, on renal disease from a medical rather than a surgical viewpoint, and there is an excellent survey of the uses of the artificial kidney. Urology has always been indebted to a select group of pathologists who have made the urinary system their special study, and chapters on tumours of the renal pelvis and testicular neoplasms seek to clarify thought on these comparatively rare conditions. The indications for, and advantages derived from, renal biopsy are fairly stated. Further light is thrown on the physiology of the testis, especially in relation to infertility. On the more surgical side a series of chapters covers the whole of the present trends in the use of part of the bowel in urology and an up-to-date résumé is given of the treatment of tuberculosis. The review of the results of irradiation therapy for carcinoma of the bladder from the Middlesex Hospital is perhaps a little more depressing than from some other centres but it shows only too well how lethal is this disease.

Sir Eric Riches is to be congratulated on the team he has collected and the individual members deserve equal praise for the very high quality of their contributions. This, of course, is a 'must' for all urologists but should also be read by all general surgeons who dabble in this specialty.

Urology in General Practice. By IAN PARTON, M.B., CH.B., B.SC., F.R.C.S. London: Butterworth & Co. (Publishers) Ltd., 1960. Pp. 304. Illustrated. Price 45*s*.

WHILST an excellent little book, this is a difficult one to evaluate for practitioners in Britain in that it goes at some length into details of treatment which are unlikely to be managed by a practitioner in this country, distances being short and communications good. Parts of the book, however, are most valuable and are commended to all doctors for study. The illustrations are excellent and the general presentation attractive. The author is to be congratulated in particular on his account of the management of ureteric calculus. Surely, however, there is a misprint on page 145 when it is stated that in decompression of the bladder the risk is greater in acute or chronic retention. Presumably this means acute *on* chronic retention. There is a most valuable bibliography at the conclusion for those readers who seek further information on any particular point.

Surgery of the Acute Abdomen. By JOHN A. SHEPHERD, V.R.D., M.D., CH.M., F.R.C.S., F.R.C.S.ED. Edinburgh: E. & S. Livingstone Ltd., 1960. Pp. 1228. Illustrated. Price £5.

MOST young surgeons have found themselves faced with an unusual acute abdominal case and have sought in vain for a book for guidance. The problems of the acute abdomen are poorly and incompletely dealt with in most general surgical textbooks. A search of the relevant literature is obviously out of the question at the time that the information is most needed, so that all too often the young surgeon is unable to

profit by previously recorded experience and may therefore make the same mistakes as his predecessors. In writing this book Mr. Shepherd has done much to fill this need. He has had a large personal experience of acute abdominal cases and also gives numerous references to the literature at the end of each chapter. The book can therefore be used not only to obtain rapid practical advice on the management of most acute abdominal cases but also as a source of references for further reading. The chapters are arranged on an anatomical or visceral basis which is helpful when seeking information relating to a particular case. The illustrations are adequate, most of them being photographs of x-rays. A few excellent line diagrams are used to describe certain features. There is an interesting appendix at the end of the book giving an analysis of 1,179 emergency abdominal operations performed by the author himself.

The whole book is presented in a very readable manner with useful subheadings for the various aspects of each subject under discussion, and it is well indexed. The book should be read by all young surgeons of registrar status and can be recommended for the library of any practising surgeon.

Clinical Neurology. By SIR RUSSELL BRAIN, BT., D.M., F.R.C.P. London: Oxford University Press, 1960. Pp. 399. Illustrated. Price 38*s*.

THE author's large 'Textbook of Neurology' is a standard work of reference, and in this smaller volume he has collected what is chiefly needed by the practising physician who has to deal with diseases of the nervous system. A practical handbook of the essentials of neurology may take one of two forms, either a series of essays on the differential diagnosis of important syndromes, or it may list a concise account of the most important diseases, their symptoms, signs and treatment. This book chooses the second of these alternatives and in so doing presents a great amount of information in a limited space.

Hypothermia in Surgical Practice. By KEITH E. COOPER, M.B., B.S., M.SC., and DONALD N. ROSS, M.B., CH.B., B.SC., F.R.C.S. London: Cassell & Co. Ltd., 1960. Pp. 116. Illustrated. Price 18*s*. 6*d*.

SOME eighteen months ago the reviewer had in mind to write or edit a book on this subject. He got so far as to draw up a table of contents and proposed authorities to write various sections. While considering this project, he discussed it with several colleagues and gradually formed the opinion that the demand for such a book would not be great and that the work was likely to fall between the two stools of being insufficiently detailed for the expert involved in this field and too profound for those who, for examination purposes, wished to acquire a superficial knowledge of the subject. Indeed the requirements of the latter group seemed already covered by available textbooks. It was therefore particularly interesting to view this production in the light of these misgivings and at once it must be said that in the reviewer's opinion the editors have succeeded admirably in producing what must be a valuable book for both groups.

The physiology is adequately treated and indeed chapter 3, on the metabolic problems of hypothermia, is as clear an exposition of this involved subject as has come to the reviewer's notice. Inevitably the pharmacology is scrappy and inadequate but those anæsthetists involved in these procedures are likely to be well acquainted with the drugs they will need. The methods of cooling are clearly and dogmatically set out. Here is described what the writers have found to work in their very considerable experience and they do not get bogged down in discussions of alternative methods. This is all to the good. The final chapter on unintentional hypothermia is particularly useful and apt.

The references are collected together at the end of the volume, which is clearly printed on good quality matt paper. Under modern conditions the reasonable price is an achievement.

A System of Medical Hypnosis. By AINSLIE MEARES, M.D., D.P.M. Philadelphia and London: W. B. Saunders Co. Ltd., 1960. Pp. 484. Price 70*s*.

THIS is a highly personal account of the use of hypnosis in medicine and in psychiatry by a psychiatrist with an eclectic approach to his subject. It is not a textbook, does not give the pros and cons of certain procedures or statements—and the bibliography consists of eleven references chosen by Dr. Meares for their usefulness and significance. It is written essentially therefore as a system of treatment in which each particular procedure is seen as part of a whole approach to the healing of the sick mind or body. But in this present day and age is such a book really necessary, and who will be its readers? It is too diffuse for the general practitioner and too anecdotal for the psychiatrist—and in any case hypnosis as a method of treatment has been given undue textbook attention in relation to its therapeutic importance. Psychiatric treatment in general is in need of a vigorous objectivization and assessment. Psychotherapeutic procedures in particular are long overdue for a critical overhaul, and it is in this direction that psychiatrists are working. Although this book is a good, honest account of hypnosis, based upon much thought

and personal experience, it is too highly priced and too extensive to compete with some recent books published in this country.

Technik der Röntgendiagnostik. By DR. HANNO POPPE, ILSE LOHSTÖTER and DR. PH. LAUWERS. Stuttgart: Georg Thieme, 1961. Pp. 683. Illustrated. Price DM. 88.

THIS is one of the best books on radiological technique the reviewer has seen. The first part is a very comprehensive covering of radiological anatomy and its application to position, and the anatomical drawings and the details of positioning are excellent. By the use of symbols, even those who are unable to understand German can use this book with the greatest of ease as the system is very precise. All the latest special techniques, such as tomography, angiocardiography, arthrography and venography, are fully covered. The second part of the book consists of useful chapters on physics as applied to radiography, dark-room technique, and in fact all that a radiographer need know. This section includes a first-class chapter on automatic processing. A book that can be recommended.

The Disabilities and Injuries of Sport. By SIR ADOLPHE ABRAHAMS, O.B.E., M.D., F.R.C.P. London: Elek Books Ltd., 1961. Pp. 95. Illustrated. Price 12*s.* 6*d.*

SIR Adolphe Abrahams is the Grand Old (Medical) Man of sport. As Mr. Harold Abrahams points out in his foreword to the book, 'he was the first Hon. Medical Officer to be appointed by the Amateur Athletic Association, and in this capacity accompanied the British Track and Field Team to the Olympic Games at Stockholm in 1912. Since then he has been with many international teams, not only at European and Olympic Games but in international teams'. No mean performer himself in his younger days in the running field, in this little book he has distilled the wisdom he has acquired during this more than half a century of active association with sportsmen (and sportswomen). The result is a book which will become essential reading for all associated with sports—whether the active participants, their trainers and coaches, or their medical attendants. All the old bogies that still persist in athletic circles are disposed of, and particular problems such as a stitch, cramp, and staleness are discussed in a practical down-to-earth manner. About half of the book is devoted to the management of the more common injuries of sport. The only criticism is that, by some, the book may not be considered quite up to date. Whilst this may be the case, it is a drawback which is more than compensated for by the wealth of sage advice with which its pages are packed.

Written in that clear concise style, with which readers of *The Practitioner* are not unacquainted, this book is one which should be consulted by all concerned with sportsmen and their injuries—including school medical officers.

Social and Medical Problems of the Elderly. By KENNETH HAZELL, M.R.C.P., D.P.M. London: Hutchinson Medical Publications Ltd., 1960. Pp. 216. Illustrated. Price 30*s.*

AT the present time the establishment of geriatric units in general hospitals is an essential part of the organization of effective medical services for the elderly in the community. Dr. Hazell devotes nearly a hundred pages of his book to a description of the structure and function of the geriatric unit. There are sections dealing with some of the more common clinical conditions and these are discussed in relation to the social problems of old age. Apt mention is made of the difficulties facing the nursing staff and the need for a high standard of nursing care of the elderly patient in hospital is stressed. The chapter on 'Welfare services and statistics' gives a full account of the services available. The book ends with the author's personal recommendations on housing policy and for the more satisfactory provision for the needs of old people in their homes.

Doctors will find useful ideas on the management of elderly patients and the book should prove of interest to those laymen who are concerned with the affairs of old people.

Lænnec. His Life and Times. By ROGER KERVRAN, M.D. Oxford: Pergamon Press Ltd., 1960. Pp. 213. Price 21*s.*

IN spite of a poor translation and an incomprehensible lack of illustrations (there is not a single one in the book), this life of Lænnec by a fellow-Breton is not without interest. Guaranteed a permanent niche in the history of medicine as the inventor of the stethoscope, Lænnec was also a classical example of success achieved in spite of adversity. A Breton born and bred, who loved nothing more than to spend his time in his native domain, he was compelled to spend most of his life in Paris. The son of an unscrupulously selfish father, his student days were unnecessarily penurious and much of his income in his latter years went in unrepaid loans to his father. Cursed with ill health practically all his life, he finally died of tuberculosis while still only in his forties. In addition, there was the inevitable professional jealousy he encountered in Paris as soon as he began to achieve fame. Whilst he is best known

as the inventor of the stethoscope, he has an equal claim to fame for his pioneer clinical and pathological work on diseases of the lungs, and as an authority on Breton history and folk-lore.

All these various facets of this intriguing personality are reviewed in this new biography, but scarcely in a satisfactory manner. There is obviously ample material to justify a full-length biography which could be a fascinating study of a complex personality. Dr. Kervran's short life whets the appetite for something better.

NEW EDITIONS

Mackie and McCartney's Handbook of Bacteriology, in its tenth edition (E. & S. Livingstone Ltd., 40*s*.), is edited by Professor Robert Cruickshank, M.D., F.R.C.P. For thirty-five years it has been the standard textbook on the subject for a multitude of undergraduates throughout the world, and it is satisfactory to know that its revision has been undertaken by the late Professor Mackie's successor in the Chair of Bacteriology in the University of Edinburgh. To those of us who learned our bacteriology from the first edition, the tenth edition is almost unrecognizable. Even compared with the ninth edition, this new edition shows an increase of over 200 pages, and the number of chapters has almost doubled. Such, however, is the price of progress and, in spite of its 'new look', it still remains the ideal book on the subject for the undergraduate and the postgraduate.

Anæsthetic Accidents, by V. Keating, M.B., B.CH., F.F.A.R.C.S., D.A., second edition (Lloyd-Luke (Medical Books) Ltd., 28*s*.).—Four years have passed since the first edition of this book was issued, and although the generality of anæsthetic accidents has not greatly changed in this period, our understanding of the basic causes of many has increased. There has been a consequent improvement in the methods of prevention and treatment. Even so, advances in anæsthesia, though leading to higher standards of practice, in some respects create more potentially dangerous situations for the unwary or unskilled practitioner. There are probably few doctors, whatever their field of specialization, who will not find something interesting, and perhaps cautionary, among these pages.

The Eye in General Practice, by C. R. S. Jackson, B.M., B.CH., D.O.M.S., F.R.C.S.ED., second edition (E. & S. Livingstone Ltd., 21*s*.).—The appearance of a second edition of this useful little manual is pleasant and indicative. Most of the features in the first edition for which your reviewer had adverse comments have been suitably modified. It would still be advisable, however, for the author to distinguish between a description of treatment by the ophthalmologist and advice for action by the general practitioner. The title of the book suggests that all mention of treatment comes in the latter category, but this is by no means so. A page has been added on the topical use of cortisone, with a very necessary warning as to its use. This edition is as well arranged and produced as the first, and will continue to fulfil its purpose.

Dilling's Clinical Pharmacology, revised by Stanley Alstead, C.B.E., M.D., F.R.C.P., F.R.F.P.S., in its twentieth edition (Cassell & Co. Ltd., 30*s*.) is an entirely new book and is quite unlike any of its nineteen predecessors. Information of pharmaceutical interest has been removed from the body of the text and placed in a series of appendixes which include a complete formulary, a full laboratory course for medical students in both practical pharmacology and pharmacy, and a section on the nomenclature of drugs. The main text has been written in collaboration with eleven named contributors. This probably accounts for its somewhat uneven quality. Some chapters give admirable, succinct and up-to-date accounts of the drugs in current use whilst others tend to look to the past. It is, for example, surprising to see so much space allotted to the heavy metals and metalloids. The student who buys this book, however, will get good value for his money, and the postgraduate will find it useful for revision, or for quick reference.

The Clinical Apprentice, by John M. Naish, M.D., F.R.C.P., and John Apley, M.D., F.R.C.P., in its second edition (John Wright & Sons Ltd., 12*s*. 6*d*.) gives to the student, for a modest sum, much that he wants in his early days in the wards, without requiring of him the labour of selecting the immediately relevant from a mass of information. Its size and soft back make it very portable, and it is easy to read, being highly explicit and simple, except possibly in parts of the chapter dealing with examination of the chest. The illustrations make their points clearly and the line drawings have a gentle humour, which is not infrequently apparent in the text itself. The idea of dividing the examination at leisure from examination of different acute situations is a very helpful one.

The contents of the May issue, which will contain a symposium on 'Midwifery,' will be found on page A 142 at the end of the advertisement section.

Notes and Preparations see page 537.
Notes from the Continent see page 541.
Fifty Years Ago see page 543.
World Health News see page A 15.
Motoring Notes see page A 103.
Travel Notes see page A 107.
Bridge Notes see page A 111.

NOTES AND PREPARATIONS

NEW PREPARATIONS

'CHOLOXIN' tablets each contain 2 mg. of sodium D-thyroxine and are intended for use in the management of hypercholesterolæmia. They are said to have specific cholesterol-lowering action with 'virtually no calorigenic action'. They are contraindicated in patients with acute myocardial infarction. Available in containers of 50 tablets. (Baxter Laboratories Ltd., London Road Trading Estate, High Wycombe, Bucks.)

'FLURYMAL' pessaries each contain 15 mg. of hydrocortisone sodium hemisulphate and 5 mg. of hexachlorophane and are said to afford symptomatic relief in leucorrhœa within 24 to 48 hours and control of non-specific vaginitis within five days. They are contraindicated in 'tuberculous processes associated with the genital tract'. Available in packs of 6 and 50 almond-shaped pessaries. (Pharmethicals (London) Ltd., 20 Gerrard Street, London, W.1.)

'NYSTATIN DUSTING POWDER' is intended for the treatment of skin lesions caused by *Candida albicans*, such as athlete's foot and napkin rashes, 'particularly in moist areas where a drying effect may aid healing'. Available in half-ounce (14 g.) plastic squeeze bottles containing 100,000 units of nystatin per gramme. (E. R. Squibb & Sons Ltd., Edwards Lane, Speke, Liverpool 24.)

'PRIMOGYN DEPOT' contains 100 mg. of œstradiol undecylenate in 1 ml. of a 'clear oily solution', and is intended for intramuscular injection in the long-term treatment of carcinoma of the prostate. Its advantages are said to include high concentration, producing and maintaining an intensive œstrogenic effect with injections at intervals of three weeks, and the fact that it does not impair liver function. Available in packs of 3 x and 20 x 1-ml. ampoules. (Pharmethicals (London) Ltd., 20 Gerrard Street, London, W.1.)

'SKEFRON' is a mixture of fluorochloromethanes contained in a metal canister and is stated to be the first preparation produced specifically for use as a cold spray for the relief of pain. It is said to give rapid relief in 'a wide range of painful conditions' including lumbago, spasmodic dysmenorrhœa, migraine, and especially in pain associated with muscle spasm. Spraying the skin of the affected area is said to initiate a barrage of nervous impulses which pass up to the central nervous system, often leading to immediate and complete or transitory relief of pain. It is said to have the following advantages over ethyl chloride cold sprays: it is virtually non-toxic, has no general anæsthetic property, is not inflammable, and does not freeze the skin so readily. Available in canisters containing 5 ounces (142 g.). (Smith Kline & French Laboratories Ltd., Welwyn Garden City, Herts.)

AWARD

THE College of General Practitioners invites applications for the 1961 *Butterworth Gold Medal*, to be awarded for an essay by a member or associate of the College on 'Future Trends in General Practice'. Entries must be received by September 30, 1961. The subject for 1962 will be 'The Evaluation and Management of Backache in General Practice'. Full details may be obtained from the Secretary of the College at 41 Cadogan Gardens, London, S.W.1.

FORTHCOMING CONFERENCE

A FURTHER refresher course of lectures and discussions on aspects of psychological medicine of interest to general practitioners has been arranged by the Department of Psychological Medicine of the Royal Free Hospital, under the auspices of the British Postgraduate Medical Federation. This will be held over the weekends of April 22-23 and May 6-7, 1961. Further details may be obtained from Dr. A. Elithorn, Royal Free Hospital, Gray's Inn Road, London, W.C.1.

ROYAL SOCIETY OF MEDICINE

THE next meeting of the Section of General Practice will be held at 8.15 p.m. on Wednesday, April 19, when the subject for discussion will be 'Sore Feet'. The opening speakers will be Dr. R. N. R. Grant, Mr. W. Alexander Law, and Mr. J. H. Hanby.

FILM NEWS

The Last of the Drum (16 mm., colour, sound; running time 21 minutes) shows the working of a central sterile supply department in a number of hospitals and also how it is possible to adapt existing premises to allow such a department to be installed. The film was made by Verity Films Ltd., under the direction of Oswald Skilbeck, with the cooperation of three hospitals and with Dr. R. A. Shooter of St. Bartholomew's Hospital as medical adviser. Available on free loan to hospital officials upon application to The Bowater-Scott Corporation Ltd., Hospital Service Division, Bowater House, Knightsbridge, London, S.W.1.

PHENACETIN BANNED

THE Swedish Board of Health has banned the unrestricted sale of tablets and powders con-

taining phenacetin. In future a doctor's prescription will be required for any preparation containing phenacetin.

SAFETY BELTS

THE Chrysler Corporation is offering safety seat belts to its dealers on a non-profit basis, and is recommending to dealers that they make belts available to owners of all makes of cars on a similar basis. The belts will cost dealers $6.35 each.

HYPOGLYCÆMIC ONIONS

As long ago as 1923, Collip reported that *Allium cepa*, the common onion, contained a hypoglycæmic agent. H. D. Brahmachari and K. T. Augusti (*J. Pharm. Pharmacol.*, 1961, **13**, 128) have now followed up this work and report that light-petroleum-soluble material from the onion has a hypoglycæmic action. When fed to rabbits, an ethyl-ether extract of this fraction had a hypoglycæmic potency equal to 76.6% of tolbutamide.

JUVENILE DELINQUENCY

A STUDY of the 183 juvenile delinquents dealt with at the West Ham Juvenile Court in 1957 is reported in the recently published annual report of the London School of Hygiene and Tropical Medicine for the year 1959-60. Only 20% of all offences were committed by individual delinquents; 69% were committed by groups of two, three, or four acting in concert. Of the crimes committed, 88% were simple stealing, and in 45% of these crimes the sum involved was less than £1; in only 25% was it greater than £10. Most crime (33%) was committed in the quarter, December-February, and least (12%) in the quarter, September-November. Of the punishments awarded, more than half (59%) were absolute or conditional discharges. Of the 97 children for whom an adequate social history was available, 56% had a good home environment, 70% had a satisfactory relationship with their parents, 42% were educationally below average, and 37% were emotionally maladjusted.

CAR THIEVES

As part of a study of 200 Borstal lads carried out by Dr. T. C. N. Gibbens, and referred to in the recently published annual report of the Institute of Psychiatry of the University of London for August 1959 to July 1960, a special study was made of the 39 car thieves in the group. This showed that, although they mostly came from the overcrowded delinquent areas of London, their homes were often 'intact, affectionate and over-protective'. They were mostly the later members of large families and many of them had reached Borstal after several convictions for which they were not sent away—probably because they seemed to have 'good' homes and to be hopeful cases for probation. They more often showed neurotic symptoms than the rest of the delinquents studied, and their offences were often carried out to give them a feeling of power, or to show their masculinity and independence.

COMPULSORY T.B. TREATMENT

THE treatment of tuberculosis is now compulsory in Hungary. Anyone who evades vaccination or screening, fails to carry out medical instruction, gives work to tuberculous subjects in scheduled trades, or carries on a private business or trade while suffering from open tuberculosis is liable to a fine of 3000 forints (£90).

PORCINE TRANQUILLIZERS

A NEW use has been found for tranquillizers by the veterinary profession. According to a report from the West of Scotland Agricultural College, they are proving of value in reducing fighting among pigs while in transport to market. For this purpose they are administered in the feed the pigs receive before setting out on the journey.

CORN OIL AND ARTERIOSCLEROSIS

IN view of the current interest in the relationship between vegetable oils, serum cholesterol and arterial degeneration, K. F. Gey and A. Pletscher (*Nature* (*Lond.*), 1961, **189**, 491) have investigated the effect of corn oil on spontaneous arteriosclerosis in old hens. They chose this 'experimental animal' on the grounds that the spontaneous arteriosclerosis in old birds is more like human arteriosclerosis than the comparable lesion in rabbits and cockerels which have so often been used for such experiments. Their results show that 'dietary corn oil failed to diminish total serum cholesterol'. Neither were visible lesions nor the total lipids or cholesterol of the aorta influenced significantly. 'Thus', it is pointed out, 'in a long-feeding period "physiological" amounts of refined edible oil (containing 54% of linoleic acid) failed to diminish spontaneous arteriosclerosis of the aorta in old hens'. Even when the amount of corn oil was doubled there was no noticeable effect after a period of three years.

GASTRIC FOREIGN BODIES

A CASE is reported by A. A. Kane and his colleagues (*J. Amer. med. Ass.*, 1960, **174**, 2075) of a 56-year-old male, from whose stomach was removed a total of 258 articles as well as 'an amorphous mass of eroded metal sludge'. The

man had been under 'custodial care' for twenty-four years with a diagnosis of dementia præcox, and there was no previous record of any physical illness. On this particular occasion he was investigated on account of pitting œdema of the ankles, and was found to have a 'peculiar irregular mass in the left lower abdomen'. Laparotomy revealed this to be the metal-loaded stomach. The contents included 26 keys, 88 coins (totalling $19.19), three sets of rosary beads (complete), six crucifixes and 16 religious medals.

SOBRIETY—AT A PRICE

Of the many remedies proposed for dealing with the problem of alcoholism, one of the most interesting is that of Professor John R. Seeley, of Toronto. In a recent issue of the *Canadian Medical Association Journal* (1960, **83**, 1361) he demonstrates an impressive inverse correlation in Canada between the price of alcoholic liquors on the one hand, and consumption and death from cirrhosis of the liver on the other. He therefore proposes that the price of alcoholic liquors should be doubled by means of taxation, producing graphs and figures to show that this would have a most gratifying effect upon the incidence of alcoholism—with the further advantage that the increased income from taxation could be devoted to developing the health services of the country.

JAPANESE AND OXFORD ROWING CREWS

A detailed comparison of the Oxford University rowing crew who went to Japan in 1959 and of three Japanese university rowing crews has been made by Y. Sawada and his colleagues (*Kumamoto med. J.*, 1960, **13**, 129). This shows that the Oxford eight was superior to the Japanese rowers in the mean of height, weight, girth of chest, neck, waist, arms, and right thigh, span of arms, strength of push, and breadth, depth and diameter of chest. On the other hand, the Japanese were superior in the mean of trunk flexibility.

PUBLICATIONS

Hearing: A Handbook for Laymen, by Norton Canfield, M.D., gives a simple but authoritative account of hearing and of deafness and its consequences at all ages. Written by a distinguished American otologist whose working life has been devoted to the care and rehabilitation of the deaf and hard of hearing, it deals sympathetically (though refreshingly free of sentiment) and practically with the many problems which confront the hard of hearing, their relatives and friends. Quite rightly, Dr. Canfield stresses the importance of seeking specialist advice as soon as possible now that there are so many ways in which deafness can be prevented, alleviated and even cured. Although written primarily for laymen, the book can be read with advantage by all who have anything to do with the deaf or hard of hearing. An added advantage is that it has been adapted for the British reader by Dr. Scott Stevenson. (Eyre & Spottiswoode, price 12*s.* 6*d.*)

Symposium on Accident Management is the report of a symposium organized by the College of General Practitioners and the Accident Institute and held in Birmingham in September 1960. This was in three sessions: 'The accident problem', 'Major injuries', and 'Burns and minor injuries', and the report includes the discussions which were held during each session. This is a publication which should be widely read. (College of General Practitioners, price 6*s.*)

From Girlhood to Womanhood, by Albert Sharman, M.D., D.SC., F.R.C.O.G., is written for the information of mothers, to help them to talk to their growing daughters. It is largely factual in content, and touches only briefly on the problems of behaviour and emotional difficulties that must face any attractive girl in today's social life, which lacks the protection and comfort of arbitrary rules and conventions. The facts extend to simple warnings about signs of local infection and of neoplasm. It deals fully with menstruation and its possible disturbances. Marriage and pregnancy are discussed straightforwardly and in some detail. The style is clear, and without any suspicion of sentimentality. The book should be useful to a woman who has had a good secondary school education, but is unlikely to be of value without that background. It is so compactly filled with information that the reader may have real difficulty in knowing what to leave out when talking to a half-impatient, half-embarrassed daughter round about the age of puberty. Nevertheless the book is a sound one. It contains a short and useful glossary of terms used in the text. (E. & S. Livingstone Ltd., price 6*s.*)

On the Causation of Varicose Veins, by Surgeon Captain T. L. Cleave, M.R.C.P., R.N.—Captain Cleave's approach is the evolutionary one. His study of the incidence of varicose veins from the historical, geographical and racial points of view lends support, well-nigh unanswerable, to his claim that the cause of varicose veins is divergence from the diet natural to the conditions under which homo was evolved. He asks: 'Is the body built wrongly, or is it built rightly but being used wrongly?'. To that question there can be only one answer. (John Wright & Sons Ltd., price 7*s.* 6*d.*)

Health in Childhood, by R. W. B. Ellis.—The Pelican public is known for the robustness of its intellectual appetite. In this volume the minds of non-medical readers will be fully stretched to comprehend so detailed a survey of health, disease, genetics, biochemistry, immunity and both normal and abnormal development. Professor Ellis fulfils the title of his Chair by considering child life broadly, and he brings to the study an international perspective with his first-hand overseas experience of tropical and nutritional problems. This volume is not a Home-Doctor Encyclopædia of childhood, a task dealt with in another volume. Rather is it a comprehensive survey of background information which will serve as a basis for enlightened concepts and attitudes to disease and health for the general public. It will be of particular value to teachers. Some readers will feel the lack of a glossary of recondite terms which doctors take for granted. (Penguin Books Ltd., 5*s*.)

Moral Principles of Fertility Control, by Denis O'Callaghan, D.D., Professor of Moral Theology, St. Patrick's College, Maynooth, is a carefully documented and closely argued outline of the view of the Roman Catholic Church on birth control. (Clinmore and Reynolds Ltd., price 2*s*. 6*d*.)

It Happened at Hopkins, by Augusta Tucker, is a 'house' publication of the Johns Hopkins Hospital. Miss Tucker is not a graduate of Hopkins, but a patient who was so impressed with the spirit of the hospital, and so grateful for what they had done for her, that she devoted the convalescence from two major operations to writing the book, and has given the copyright and the proceeds to the Hospital. She tells of the foundation of Hopkins, of the great doctors, Welch, Osler, Kelly, and Halsted, John Finney and Hugh Young, who laid the foundations of its fame, and of the many far-sighted benefactors, such as the picturesque 'Diamond Jim' Brady, who helped to provide the structure in which the work was done. Those who have worked in Hopkins, and those whose goal is to work there in the future, will want to see this book. (Johns Hopkins Hospital, Baltimore, price $2.50.)

Valiant Companions, by Helen E. Waite, is a short attractively written biography of Miss Anne Sullivan (later Mrs. Macey) the original teacher and life-long companion of Miss Helen Keller, the world-famous blind deaf mute. Miss Keller was a completely untrained, almost uncontrollable though bright, child of seven when Miss Sullivan was first engaged as her teacher. Inevitably this book is almost as much about the pupil as the teacher, and in the end the reader finds it rather difficult to decide which is the more courageous or outstanding of the two. (Hodder and Stoughton Ltd., price 15*s*.)

Better Offices deals with all aspects of the problem of providing adequate office accommodation and includes sections on heating and ventilation, lighting, noise protection. There is also a section on 'Amenities', including catering, cloakrooms and washing facilities, rest rooms, accidents and hazards, and facilities for first aid. (Institute of Directors, price 10*s*. 6*d*.)

OFFICIAL PUBLICATIONS

Cysticercosis; An Analysis and Follow-Up of 450 Cases, by H. B. F. Dixon, M.C., M.D., F.R.C.P., and F. M. Lipscomb, O.B.E., F.R.C.P., which is Medical Research Council Special Report Series No. 299, is a continuation of Sir William MacArthur's original work on the subject. The series is believed to contain all British cases diagnosed up to 1957. The main conclusions to be drawn from the report are that cysticercosis is a comparatively rare disease and that operative surgical measures are of limited value. On the other hand, the prognosis is not as unfavourable as has been supposed, and the disease is fatal less often than has been supposed. (H.M. Stationery Office, price 6*s*. 6*d*.)

The Two-Year Mass Radiography Campaign in Scotland 1957-1958, by Ian M. Macgregor, M.D., D.P.H., has the subtitle 'A study of tuberculosis case-finding by community action', and reports the results of an intensive campaign over 21 (mostly central) areas covering two-thirds of Scotland. Nearly 2,000,000 people were x-rayed and 12,094 new cases of tuberculosis were revealed. Among the many items of interest in the report are that nearly two-thirds of the new cases were found in Glasgow, new cases were mostly among older men and younger women, and about two-thirds of all cases were among men. Although the response was some 50% higher than expected (about 68%), at least one-third of the adults resident in these areas failed to cooperate. As the prevalence of new disease is probably higher among people who do not cooperate the report emphasizes that 'it has therefore become a matter of special concern' to achieve the examination of these individuals through the routine diagnostic case-finding programme. (H.M. Stationery Office, price 7*s*.)

Corrigendum.—The names of the authors of the third edition of *Varicose Veins*, reviewed on p. 408 of our March issue, should read as follows:—R. Rowden Foote and A. Gordon Dingley.

NOTES FROM THE CONTINENT

A European Newsletter

FRANCE

Sahara medicine.—Six hundred thousand inhabitants scattered over an area of 2 million square kilometres. Such is the problem to be faced in providing medical services for the inhabitants of the Sahara, as outlined in a recent special number of *Concours Médical* (December 3, 1960). Unlike Gaul, the Sahara is divided into only two administrative departments: Les Oasis, the chief 'town' of which is Ouargla, and La Saoura, the chief 'town' of which is Colomb-Bechar. These two towns are the administrative centres of their respective departments, and are equipped with hospitals. At the hospital in Colomb-Bechar a thousand operations are performed annually under general anæsthesia. Incidentally, one of the features of the medical service in the Sahara is that there is only one service for both civilians and military personnel.

Each department is divided into medical districts, each of which is based on a dispensary in charge of a doctor, assisted by nurses, midwives and social workers drawn from either the local inhabitants or French personnel. Over 90% of the doctors are military personnel, and the civilian doctors are posted where the population is most dense: e.g. at places such as Djamaa, Laghouat, and Colomb-Bechar. In addition there are smaller rural centres. These were originally established as part of the campaign to combat the eye diseases which used to be a major scourge of these areas. Now they have developed into dispensaries visited at least weekly by a doctor who then advises the resident nurse. These centres are quite small—often merely a single room, and are stocked with only simple dressings and remedies such as aspirin, bicarbonate of soda, and cough mixtures.

'*Sahara pathology*'.—What is described as the 'Sahara pathology' is steadily being modified. Smallpox is no more than a memory, typhus has almost disappeared, whilst typhoid fever, brucellosis, vesical bilharziasis and leishmaniasis are all on their way out. Malaria, too, is rapidly disappearing. Today the predominant medical problem is diseases of the eyes. Half of the patients are seen on account of an ocular infection, and almost all have signs, or sequelæ, of trachoma. Blindness is common, not only due to trachoma but also to a 'seasonal ophthalmia' which occurs in epidemics, is often acute and sometimes fulminating in its course. The causative organism is the Koch-Weeks bacillus. It is sometimes followed by a secondary outbreak of ophthalmia due to the gonococcus. Other common eye conditions are keratitis, elagophthalmos, cataract, and retinitis pigmentosa, the last often being complicated by retinitis proliferans due to vitamin A deficiency. Detachment of the retina and malignant disease of the eye are also commonly encountered.

Sahara industrial medicine.—Industrial medicine must now be added to the problems of Sahara medicine—largely as a result of the development of the oil resources of the area. Apart from the occupational hazards encountered in the oil industry elsewhere, in the Sahara there are the problems of the climatic adjustment of employees from metropolitan France. These problems are not only physical but also involve the psychological adjustment of such employees to the conditions of working in the midst of the Sahara.

Liver fluke infestation.—In a review of the incidence of infection with *Fasciola hepatica* in France, Dao Van Ty notes that the areas in which it occurs are the sheep-raising areas, such as Bearn, Les Landes, Lot-et-Garonne, the Massif Central, Saône-et-Loire, the east of France and, above all, the area around Lyons. In the autumn and winter of 1956, the Lyons area headed the areas, with a high incidence of fluke infestation of 500 cases. The department of Aïn alone, succinctly described by Dr. Van Ty as 'pays du bon manger', had 300 cases. In treatment, emetine is rather variable in its effects, and recently, phanquone (4:7-phenanthroline-5:6-quinone) has been used. Insufficient experience has yet been acquired to justify any definite statement as to the value of phanquone, but there seems little doubt that it is more effective than emetine in the phase of biliary infestation. In this phase, in which three or four courses of emetine are usually required, phanquone appears to be effective in one course.

Poisons information.—Since March 1959, Paris has had a 'poisons-intoxication' centre. This is situated in the Hôpital Fernand and is staffed night and day. In addition to a filing system and library, it has two resuscitation rooms and a recovery room. Anyone can telephone it for information as to how to deal with a case of poisoning. The use to which it has been put

since its inauguration has fully justified its existence. Thus, in one year it was responsible for the treatment of 226 cases of acute poisoning, including 73 cases of barbiturate and gas poisoning, and 53 cases of poisoning with sedatives and tranquillizers.

ITALY

Carcinoma of the lung.—A. Terreta and G. Farinet have recently reported on a retrospective survey of 150 cases of carcinoma of the bronchus, with special reference to the initial symptomatology and the radiological findings. The most common initial symptom is pain, followed by hæmoptysis, cough, asthenia and dyspnœa. The average duration of time between the initial symptoms and diagnosis was five months.

Radiological examination revealed a central location of the neoplasm in just over three-quarters of the cases (75·3%). In view of the marked discrepancy between this finding and the commonly accepted view that such tumours are usually peripheral in origin, it is suggested that many of those radiologically diagnosed as being central were actually peripheral in origin. The view is expressed that the only radiological sign that is definitely diagnostic of carcinoma of the bronchus is a peripheral nodular opacity which produces definite malformation of a peripheral bronchus. The most common mistake is to make a diagnosis of pulmonary tuberculosis, and this occurred in 16 of the 150 cases in this series, who were treated for long periods as cases of tuberculosis. The course these cases ran was a long one, which is explained by the fact that they were cases of squamous-cell carcinoma, which is the type that runs a slow course. The average duration of time between the first symptoms and the final diagnosis of these cases was seven months—compared with five months for the entire group.

In view of these findings it is recommended that in all cases in which the radiological differentiation between a tuberculous lesion and a peripheral bronchial carcinoma is not clear-cut, surgical resection should be carried out if anti-tuberculous chemotherapy does not result in some improvement within a short space of time.

Polio vaccination and rehabilitation.—As a result of an eight-months' follow-up of 66 patients with poliomyelitis submitted to a full course of rehabilitation, D. Piantoni and C. Carbone conclude that poliomyelitis vaccination is of value, not only as a prophylactic, but also as a means of improving functional recovery from the disease in those who acquire it. Thus, the recovery of muscular function was no better in those who had received one dose of vaccine than in those who had never been vaccinated. On the other hand, among those who had received two injections both the rate of recovery and the final degree of recovery was much better than in those who had never been vaccinated, whilst among those who had received three injections the final degree of recovery was either 'good' or 'complete'.

Salivary hæmagglutination in viral hepatitis.—A factor which agglutinated group O Rh-negative blood cells was found by F. Coraggio and his colleagues in the saliva of a group of 15 patients with viral hepatitis; but in none of a series of patients with cirrhosis of the liver. The level of this agglutinating factor decreased with the course of the disease. There appeared to be no direct correlation between the salivary agglutinating factor and the serum transaminase, although in a number of cases there was an increased serum transaminase level in those in whom they isolated the hæmagglutinating factor in the saliva. In view of the fact that such a factor has been isolated in poliomyelitis, it is suggested that if its presence is also demonstrated in other known viral infections, then it may prove to be a useful test in the diagnosis of viral infections.

A fatal case of viral infection of the mucous membrane.—A case is recorded by A. Finzi of an infection of the mucous membrane by an APC virus in a woman, aged 49, which proved fatal. When admitted to hospital the patient had numerous vesicular lesions, eroded and covered by an adherent fibrinous exudate, and surrounded by an area of erythema, on the mucous membrane of the mouth and tongue. Similar lesions, but more extensive and covered with a hæmorrhagic membrane, were present on the lips, and similar lesions, accompanied by considerable congestion and swelling, were present on the labia majora and minora. In spite of intensive treatment with a wide range of antibiotics, xenalamine, corticosteroids, gamma globulin, and numerous blood and plasma transfusions, the patient died three months after admission to hospital. An organism apparently belonging to the APC group of viruses was grown from the blood, the cerebrospinal fluid and fluid from the vesicles.

'Notes from the Continent' are produced in collaboration with the Editors of *Bruxelles Médical* (Belgium), *Le Concours Médical* (France), *Münchener Medizinische Wochenschrift* (Germany), and *Minerva Medica* (Italy).